Service Manual

PT-200FT, PT-200RC & PT-56
Gas Booster Heaters

ANSI Z21.10.3
CAN 1-43 – M85 NSF 5e- 2000

Warning: If the information in this service pack is not followed exactly, a fire or explosion may result causing property damage, personal injury, or death.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not turn any electrical switch on or off
- Do not use the phone in your building
- Immediately call your gas supplier from a neighbor's phone
- If you cannot reach your gas supplier, contact the fire department.

Installation and service must be performed by a qualified installer, service agency or gas supplier.

Should overheating occur or the gas supply fails to shut off, turn off the manual gas control valve at the appliance.

Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been under water.

IMPORTANT NOTICE TO REPAIR TECHNICIAN

Repair Technician must call PrecisionTemp PRIOR to starting WARRANTY repairs to obtain a warranty authorization number.
No reimbursements will be made without an authorization number.
NO additional time reimbursements will be made without prior authorization. All warranty parts must be returned within 15 days of completing repair (return label supplied). All warranty invoices must be accompanied by a copy of the technician worksheet detailing the customer complaint, correction and product serial number. **NO Facility** issues are covered by PrecisionTemp's warranty.

CALL BEFORE SERVICING
M-F 9am-5:30pm ET
800-934-9690 or 513-641-4446
After Hours tech calls M-F 6-9pm ET and Saturdays 9am-3pm ET 513-373-8357

PT-200 & PT-56 Installation and Service Bulletin Contents

- Parts and Labor Warranty
- Warranty Policy Procedure

- Introduction
- PT-200FT Design and Sequence of Operation
- PT-200RC Design and Sequence of Operation
- PT-56 Design and Sequence of Operation
- Reference Component Illustrations
- Control Board Layout Illustration
- PT-200FT Troubleshooting Guide
- PT-200RC & PT-56 Troubleshooting Guide
- PT-200FT Electrical and Plumbing Schematics
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- PT-200FT Service Codes
- PT-200RC & PT-56 Service Codes

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    - SB-13 Flow Meter Check and Replacement
    - SB-14 Burner Manifold Pressure Check and Adjustment
    - SB-15 T-Mid Thermistor Change Procedure
    - SB-16 T-Out/ T-In Thermistor Change Procedure
    - SB-17 Thermistor Reading Procedure
    - SB-18 PT-56 Tank Replacement
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    - SB-20 PT-56 Testing Procedure

- Thermistor Calibration Chart
- Replacement Parts List
- Preventative Maintenance Schedule
- Installation Manual
- Factory Authorized Startup Procedure

MANUFACTURER'S LIMITED PARTS AND LABOR WARRANTY/GAS BOOSTER HEATER

RAD Technologies, Inc, d/b/a PrecisionTemp, also called the 'Company' hereafter, warrants the products it manufactures to be free of defects in both material and workmanship, under normal use and service, when installed and maintained in accordance with PrecisionTemp written instructions, subject to the time periods, terms, and conditions stated below:

The warranty period is eighteen (18) months parts and twelve (12) months labor from the date of in-service or Factory Authorized Start-Up. For booster heaters that are wall mounted, the Company will extend the warranty by six (6) months for both parts (total 24 months) and labor (total 18months). The burner, heat exchanger and tank replacement are warranted for five (5) years (parts only), which will be pro-rated after the first year (call factory for details). Defective parts will be repaired or replaced at the manufacturer's sole discretion.*

This warranty does not cover failure in any water components including tank, heat exchanger or pump due to freezing, chemical attack, sediment buildup, liming, or scaling due to hard water. Labor charges will be paid by the Company based on PrecisionTemp service labor rate schedule on work performed during regular business hours. Overtime premiums will not be paid by PrecisionTemp. The length of the warranty on any warranty replacement item will be the lesser of ninety (90) days or unexpired portion of the original warranty. Outside the Unites States and Canada, the Company liability is limited to the replacement of the warranted part as specified by the time periods and conditions above.

The Company limits warranty travel time to a maximum total of two (2) hours and one hundred (100) miles. The Company will not pay travel time or mileage that exceeds this without prior authorization. All warranty service must be completed by the Company or its authorized agencies. The Company does not authorize any other person or company to perform warranty service on the Product.

IN ALL EVENTS, NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, SHALL EXTEND BEYOND THE RESPECTIVE TIME PERIODS OR TERMS DESCRIBED ABOVE. IN NO EVENT WILL PRECISIONTEMP BE LIABLE FOR INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES SUCH AS LOSS OF USE OR INJURY TO OTHER PROPERTY, LABOR COSTS, OR LOST PROFITS RESULTING FROM USE OR INABILITY TO USE PRODUCT.

IN ORDER TO ACTIVATE THE TERMS OF THIS WARRANTY, THE PURCHASER MUST CONTACT PRECISIONTEMP AND PERFORM A FACTORY AUTHORIZED START-UP.
***Accessory components supplied by PrecisionTemp, carry a one-year parts only warranty. Accessory components include, but are not limited to: temperature gauge, expansion tank, ball valve, drain valve, pressure reducing valve, and relief valve. Labor to replace these components is not covered by this warranty.**

LIMITED WARRANTY PROVISIONS

This warranty is intended to provide you with protection against abnormal failure due to faulty materials or workmanship. It does not cover adjustment or replacements due to normal wear. This warranty shall not cover:

1. The cost of labor for stopping leaks that may be corrected by tightening.

2. Damage resulting from untreated hard water conditions resulting in liming or scaling, clogging of valves preventing proper operation, objects such as dirt, sand, chemical buildup or debris, or broken parts caused by solder or other debris passing through this unit.

3. Transportation, installation or removal costs are not covered by this warranty. This warranty does not cover any failures or operating problems due to abuse, accident, alteration of equipment, improper installation, negligence, application of improper voltage, or recalibration of thermostats or limit switches.

4. Damage caused by over-voltage or use with utility service other than designated on the machine's rating plate or improper connection to utility service. Failure to comply with local building codes, inadequate wiring or plumbing.

5. Damage caused by excessive water pressure.

6. Regular maintenance is owner's responsibility.

7. Any additional time required to gain access to service the equipment. Additional charges will be billed to the customer.

8. Incidental, special, or consequential damages such as loss of use or injury to other property, labor cost, or lost profits resulting from use or inability to use product.

This warranty is void if defect is due to damage from shipment handling, fire, water, accident, abuse, misuse, acts of God, attempted repairs or improper installation by unauthorized persons, if serial numbers or identifying marks have been removed or altered, or if equipment is used for purposes other than that for which it is intended. 7/2008

Manufacture's Limited Parts and Labor Warranty

Limited Warranty Provisions

This warranty is intended to provide you with adequate protection against abnormal failure due to faulty materials or workmanship, but it does not cover adjustment or replacements due to normal wear.

This warranty shall not cover:

1. The cost of labor for stopping leaks that may be corrected by tightening.

2. Damage resulting from untreated hard water conditions resulting in liming or scaling, clogging of valves preventing proper operation, objects such as dirt, sand, chemical buildup or debris, or broken parts caused by solder or other debris passing through this unit.

3. Transportation, installation or removal costs are not covered by this warranty. This warranty does not cover any failures or operating problems due to abuse, accident, alteration of equipment, improper installation, negligence, application of improper voltage, or recalibration of thermostats or limit switches.

4. Damage caused by over-voltage or use with utility service other than designated on the machine's rating plate or improper connection to utility service. Failure to comply with local building codes, inadequate wiring or plumbing.

5. Damage caused by excessive water pressure.

6. Regular maintenance is owner's responsibility.

7. Any additional time required to gain access to service the equipment. Additional charges will be billed to the customer.

This warranty is void if defect is due to damage from shipment handling, fire, water, accident, abuse, misuse, acts of God, attempted repairs or improper installation by unauthorized persons, if serial numbers or identifying marks have been removed or altered, or if equipment is used for purposes other than that for which it is intended.

PrecisionTemp Warranty Procedure

The following procedure must be followed to implement the PrecisionTemp "Manufacturer's Limited Warranty". Please refer to the "Manufacturer's Limited Warranty" for full terms.

To Make a Warranty Claim

1) Contact PrecisionTemp prior to going to the service site. When the technician arrives at the service location, he must call PrecisionTemp @ 513-641-4446 or 800-934-9690. **NO work should be performed prior to calling PrecisionTemp for a work authorization number.** This work will be considered unbillable time and could void the warranty.

If it is known in advance that warranty work must be performed on PrecisionTemp equipment outside of PrecisionTemp's normal business hours (9:00 AM – 5:00 PM Eastern time), call one of the above numbers in advance for the phone number of a PrecisionTemp technician to assist you after-hours.

2) If it is known in advance that a part is needed for the service, the service call must not be made until part is on-site.

3) The equipment serial number, work authorization number and installation location MUST be on all paper work..

4) Parts replaced under warranty **must be returned to PrecisionTemp within 15 (fifteen) days of claim.**

5) Hourly rate and travel expense must be approved in advance of work being performed. **Under no circumstances will PrecisionTemp pay overtime fees.**

6) All warranty invoices must be accompanied by copies of the technician's work sheet detailing the service performed and hours worked.

7) Accessory components supplied but not installed by our factory carry a one-year **parts only** warranty. Labor to replace these components is not included. The length of the warranty on any replacement item will be the lesser of (90) days or unexpired portion of the original Warranty.

PrecisionTemp will cover warranty work preformed only on PrecisionTemp products for defects in material or workmanship, not problems related to the facility, installation or related equipment issues such as:

- **Improper water pressure.**
- **Tripped circuit breaker.**
- **Improper installation including blocked access to heater access panel.**
- **Improper primary hot water temperature or water pressure issue.**
- **Cold water bypass or negative air pressure in facility.**
- **Improper power hookup or power turned off.**
- **Undersized gas line or low gas pressure.**
- **Water flow problems caused by the ware washer such as liming or defective solenoid valves.**
- **Excessively long recirculation loops or undersized plumbing components.**
- **Any problem that is a result of any of the above situations that occur due to misrepresentation of the facilities to PrecisionTemp, consultants or installers prior to or after equipment installation.**

Warranty coverage is based on PrecisionTemp's warranty policy. PrecisionTemp may, at times, arrange service as a courtesy to the customer. This does not imply that PrecisionTemp guarantees the performance of this service or is responsible for the charges. PrecisionTemp will not pay for additional time required to gain access to its equipment or for the technician not being given access to equipment in a reasonable time-frame. PrecisionTemp reserves the right to accept or deny warranty claims based on the above policy.

PrecisionTemp Parts Warranty Policy:

All replacement parts are covered for a period of 90 days from the time of installation. Parts replaced under the terms of basic product warranty are covered through the product warranty period or 90 days whichever is greater. Parts replaced on units not covered by basic product warranty have a parts only warranty with NO labor coverage for a period of 90 days from the date of installation.

Service Time Replacement Guide for PT-200

Part Number	Component Description	Diagnostic Time	Replace		Test
1019	Ignition Probe	0.3	0.2		0.1
1092	Modulating Valve	0.50	0.5		0.2
1119	3 Amp Circuit Breaker	0.20	0.2		—
1436	T-In Assy	0.20	0.2		0.1
1437	T-Out Assy	0.2	0.2		0.1
1463	Solenoid Valve NG Robertshaw	0.50	0.5		0.1
1496	Wire Harness 12v DC to Board	0.20	0.2		—
1613	24v DC Power Supply	0.30	0.3		—
1615	Relay 12v DC Control	0.30	0.2		—
1616	Pressure Switch	0.30	0.2		0.2
1634	Pressure Reducing Valve	—	Parts Only		—
1749	ECO	0.2	0.2		0.1
1752	Pressure Relief Valve	—	Parts Only		—
1765	Ignition Wiring Harness	0.3	0.3		0.1
1826	Power Wire Harness /Cont Bd.	0.20	0.2		—
1854	T-Mid Assy	0.2	0.2		0.1
1875	Blower Assy	0.30	0.5		—
1896	Dual Temp Dig.Display	0.20	0.3		—
1897	12v DC Power Supply	0.2	0.3		—
1994	Heat Exchanger w/ass't parts	—	—		—
2004	Switch on/off	0.20	0.1		—
2066	T-In Assy, temp display	0.2	0.2		—
2067	T-Out Assy, temp display	0.2	0.2		—
2354	Flowmeter Assy	0.30	0.3		—
2412	DSI Board	0.3	0.2		0.1
2416	Flow Meter Gaskets	0.20	0.3		—
1841 200	Control Bd. & Microprocessor	0.50	0.2		—
ACAL	Automatic Calibration	—	0.5		—

INTRODUCTION

Which type of booster heater do I have?
PrecisionTemp manufactures two booster heater models.

1. The PT-56 is used for all single rack door-type dishmachines. This unit is ETL certified for ventless operation (check local codes as some states do not allow ventless gas appliances) and has an internal tank and pump.

2. The PT-200 is used for all conveyor and flight type dishmachines. This unit requires a flue be fitted. This flue can exit into the pant leg duct or exhaust / condensate hood over the dishmachine (check local codes). There are three types of PT-200:

    a. PT-200FT-199,000BTU flow through design where the booster is located close to the dishmachine, typically under the dish table. Rinse flow rate 4-5+gpm. **NOTE:** The NSF-5 Code requires that booster heaters be located within five pipe feet of the dishmachine to maintain proper rinse temperature. If this cannot be accomplished, the pipe must be insulated or a recirculation system be installed.

    b. PT-200OR-125,000BTU same as the PT-200FT, it is used for newer low flow water conserving dishmachines. Rinse flow rate 2-3gpm. For service issues, use the PT-200FT installation, operation, and service instructions

    c. PT-200RC- recirculation design, where the booster heater is located far from the dishmachine. An additional pump and storage tank are fitted to the water lines to the dishmachine, external to the booster heater.

3. Aside from the model number, you can verify which model you have by looking at the model number label located on the front panel of the booster heater.

IMPORTANT! Verify which software version you have before completing any service!
You can verify this by looking at the software version label on the green electronic board inside the electronic drawer. When using this service manual, ensure you are using the correct software version. Check the software version label on the microprocessor with the list below:

1. PT-200 RC & PT-56 Software versions: 9098-A, 9098-B, 9098-C, 9098-D, 9098-E, 9098-F, 9098-G, 9098-H, 9098-I, 9098-J, 9098-K, 9098-L, 9098-M, 9098-N, 9098O

2. PT-200FT Software versions: 9097-A, 9097-B, 9097-C, 9097-D, 9097-E, 9097-F, 9097-G, 9097-H, 9097-I, 9097-J, 9097-T

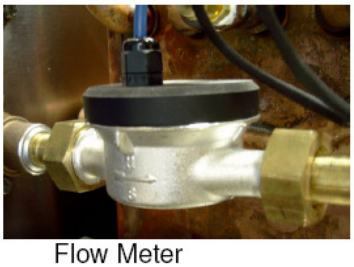
3. PT-200OR Software versions: 9099-A, 9099-B, 9099-C, 9099-D, 9099-T

PT-200 Component Illustrations

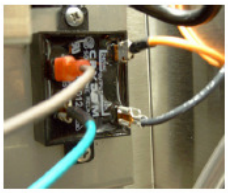
Illuminated Power Switch
Illustration # 200-1
Part # 2004

Green LED
Illustration # 200-2

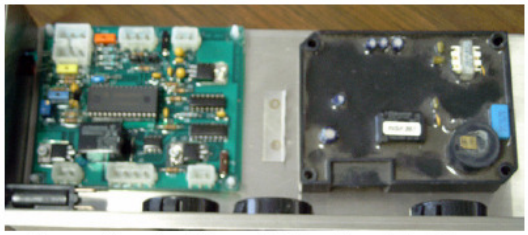
Digital Temperature Display
(Burner Off)- not installed on
PT-200RC
Illustration # 200-3
Part # 1896



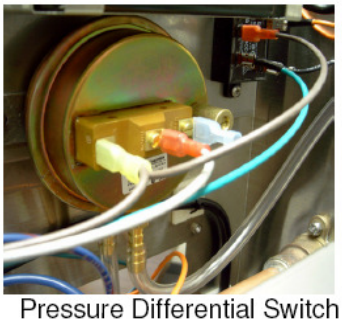
Flow Meter
Illustration # 200-4
Part # 2354
Not installed on PT-200RC



Solid State Blower Relay
Illustration # 200-7
Part # 1615



Green Control Board & Ignition Module
Illustration #200-5

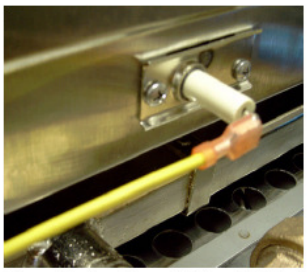


Pressure Differential Switch
Illustration # 200-6
Part # 1616

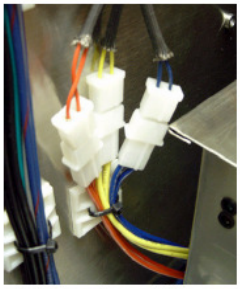
Combination Gas Valve
Illustration # 200-9
Part # 1463

Power Vent Blower
Illustration # 200-8
Part # 1875

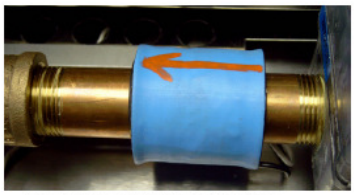
Digital Temperature Display
(Burner On)- not installed on
PT-200RC
Illustration # 200-11



Spark Ignition Wire & Probe
Illustration # 200-10
Part # 1765 & 1019



Thermister Harness
Illustration # 200-13
Part # 2265
NOTE: Thermister harness leads to all
thermisters attached to the heat exchanger
Blue= T-in (not installed on PT-200RC)
Yellow= T-Mid
Red= T-Out



Gas Modulation Valve
Illustration # 200-12
Part # 1092 (NG) or 1662 (LPG)

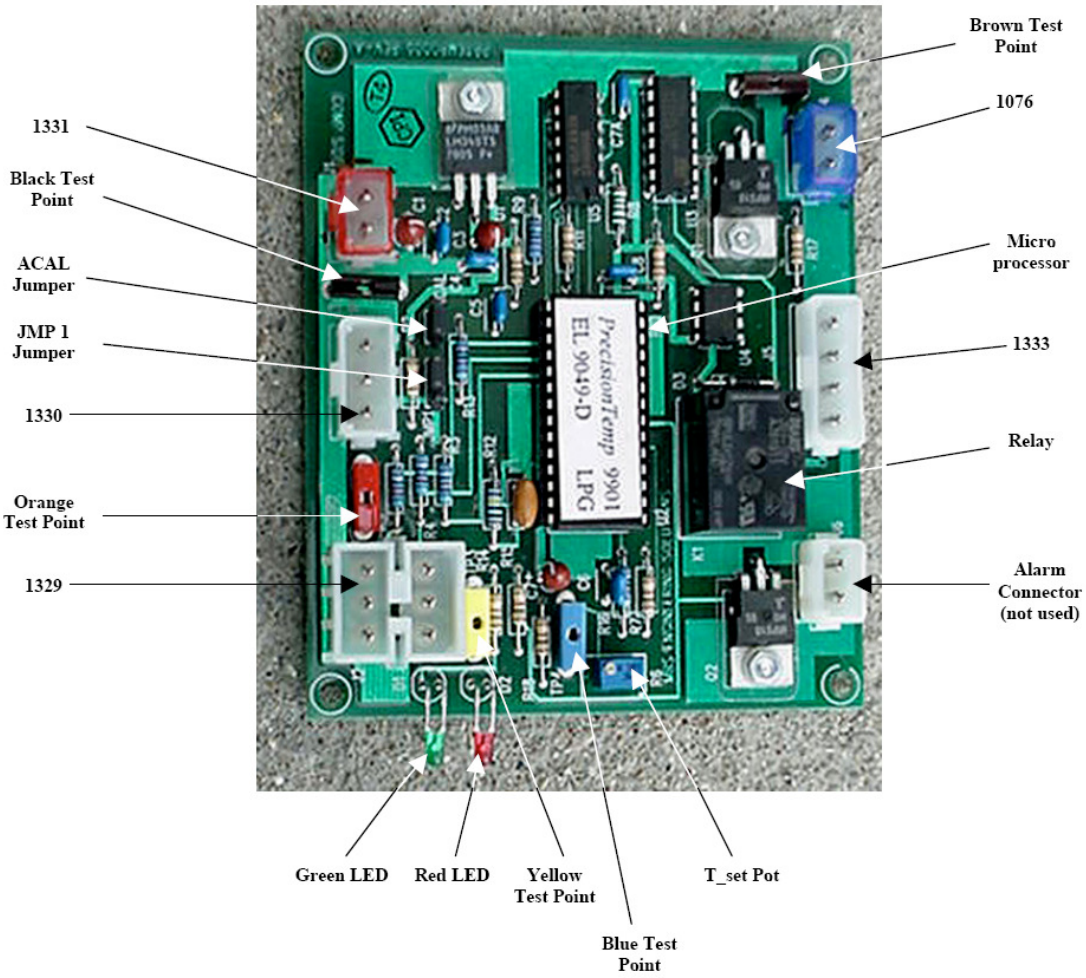
Turbine Flowmeter # 3226
Illustration # 200-3226

Pressure Switch # 2937
Illustration # 200-2937

Ignition Board pedestal #3166
Illustration # 200-3166

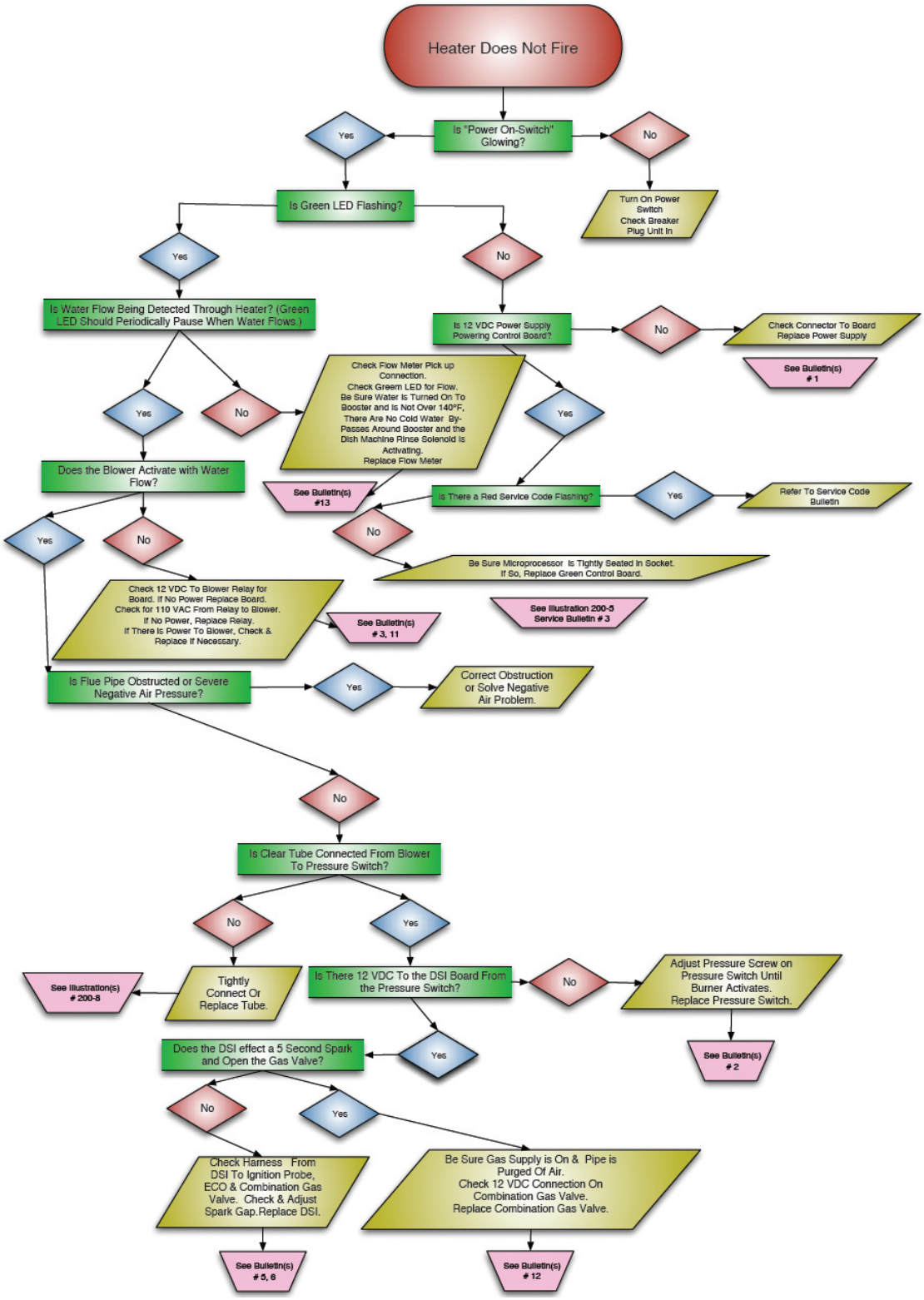
DSI Ignition Board #3158
Illustration # 200-3158

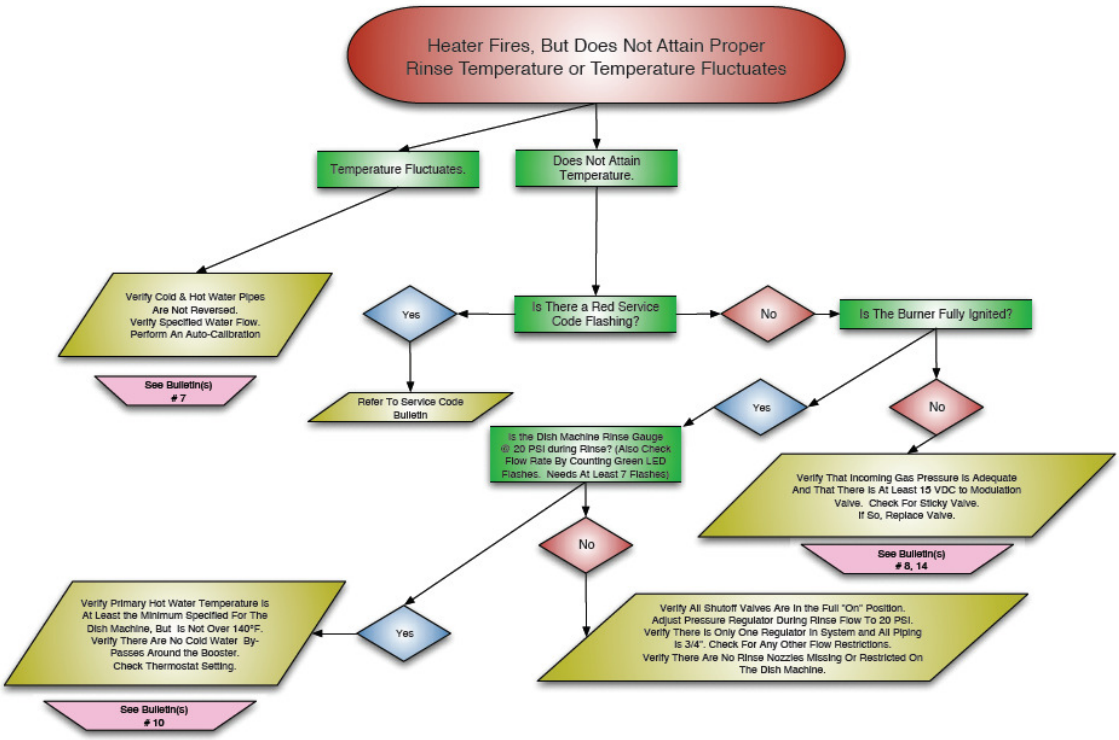
Electronic Control Board
Illust. 200-14

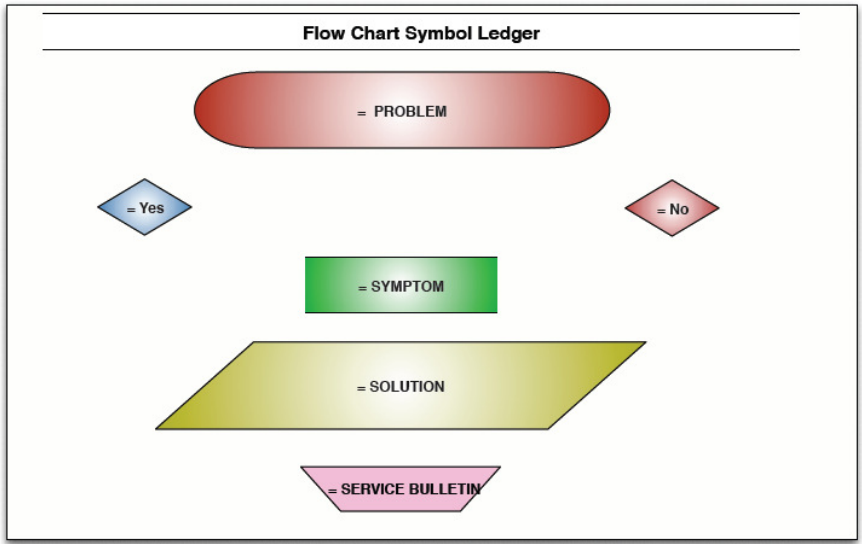


1076	Modulating Gas Valve Connection
1329	Thermister Wiring Harness Connector
1330	Flowmeter Connection
1331	Power Supply Wiring Harness Connector
1333	DSI Wiring Harness Connector
Alarm	Alarm Connector Not Used (in this application)
ACAL Jumper	Jumper for Auto-Cal
JMP 1 Jumper	Board Function Jumper
Orange Test Point	Test Point for T_out Thermister
Yellow Test Point	Test Point for T_mid Thermister
Blue Test Point	Test Point for Setting Temperature
Brown Test Point	Test Point for Modulating Valve
Black Test Point	Test Point for Ground (common)

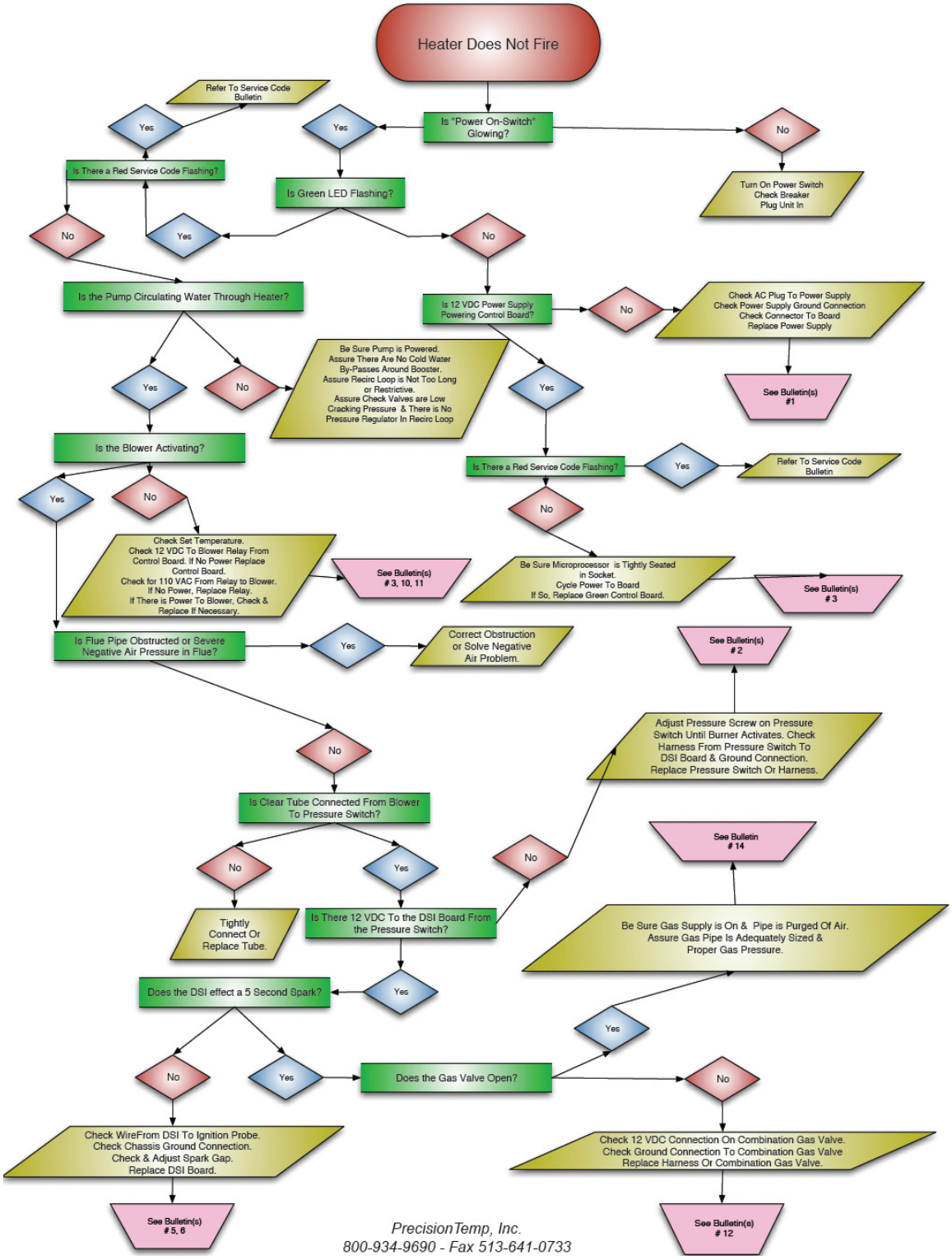
PT-200-FT (Flow Through) Troubleshooting Guide


Heater Does Not Fire
Is "Power On-Switch" Glowing?
Yes
No
Turn On Power Switch Check Breaker Plug Unit In
Is Green LED Flashing?
Yes
No
Is Water Flow Being Detected Through Heater? (Green LED Should Periodically Pause When Water Flows.)
Is 12 VDC Power Supply Powering Control Board?
No
Check Connector To Board Replace Power Supply
See Bulletin(s) # 1
Yes
No
Check Flow Meter Pick up Connection. Check Greem LED for Flow. Be Sure Water Is Turned On To Booster and Is Not Over 140°F, There Are No Cold Water By-Passes Around Booster and the Dish Machine Rinse Solenoid Is Activating. Replace Flow Meter
See Bulletin(s) #13
Yes
Does the Blower Activate with Water Flow?
Is There a Red Service Code Flashing?
Yes
Refer To Service Code Bulletin
Yes
No
No
Be Sure Microprocessor Is Tightly Seated In Socket. If So, Replace Green Control Board.
See Illustration 200-5 Service Bulletin # 3
Check 12 VDC To Blower Relay for Board. If No Power Replace Board. Check for 110 VAC From Relay to Blower. If No Power, Replace Relay. If There Is Power To Blower, Check & Replace If Necessary.
See Bulletin(s) # 3, 11
Is Flue Pipe Obstructed or Severe Negative Air Pressure?
Yes
Correct Obstruction or Solve Negative Air Problem.
No
Is Clear Tube Connected From Blower To Pressure Switch?
No
Yes
See Illustration(s) # 200-8
Tightly Connect Or Replace Tube.
Is There 12 VDC To the DSI Board From the Pressure Switch?
No
Adjust Pressure Screw on Pressure Switch Until Burner Activates. Replace Pressure Switch.
See Bulletin(s) # 2
Does the DSI effect a 5 Second Spark and Open the Gas Valve?
Yes
No
Yes
Check Harness From DSI To Ignition Probe, ECO & Combination Gas Valve. Check & Adjust Spark Gap.Replace DSI.
See Bulletin(s) # 5, 6
Be Sure Gas Supply is On & Pipe is Purged Of Air. Check 12 VDC Connection On Combination Gas Valve. Replace Combination Gas Valve.
See Bulletin(s) # 12


Heater Fires, But Does Not Attain Proper Rinse Temperature or Temperature Fluctuates
Temperature Fluctuates.
Does Not Attain Temperature.
Verify Cold & Hot Water Pipes Are Not Reversed. Verify Specified Water Flow. Perform An Auto-Calibration
See Bulletin(s) # 7
Yes
Is There a Red Service Code Flashing?
No
Is The Burner Fully Ignited?
Refer To Service Code Bulletin
Yes
No
Is the Dish Machine Rinse Gauge @ 20 PSI during Rinse? (Also Check Flow Rate By Counting Green LED Flashes. Needs At Least 7 Flashes)
Verify That Incoming Gas Pressure Is Adequate And That There Is At Least 15 VDC to Modulation Valve. Check For Sticky Valve. If So, Replace Valve.
See Bulletin(s) # 8, 14
No
Verify Primary Hot Water Temperature Is At Least the Minimum Specified For The Dish Machine, But Is Not Over 140°F. Verify There Are No Cold Water By-Passes Around the Booster. Check Thermostat Setting.
Yes
Verify All Shutoff Valves Are In the Full "On" Position. Adjust Pressure Regulator During Rinse Flow To 20 PSI. Verify There Is Only One Regulator In System and All Piping Is 3/4". Check For Any Other Flow Restrictions. Verify There Are No Rinse Nozzles Missing Or Restricted On The Dish Machine.
See Bulletin(s) # 10


Flow Chart Symbol Ledger
= PROBLEM
= Yes
= No
= SYMPTOM
= SOLUTION
= SERVICE BULLETIN

PT-200-RC (Re-circulating) Troubleshooting Guide


Heater Does Not Fire
Is "Power On-Switch" Glowing?
Yes
No
Turn On Power Switch
Check Breaker
Plug Unit In
Is Green LED Flashing?
Yes
No
Refer To Service Code Bulletin
Yes
Is There a Red Service Code Flashing?
No
Yes
Is the Pump Circulating Water Through Heater?
Yes
No
Be Sure Pump is Powered.
Assure There Are No Cold Water By-Passes Around Booster.
Assure Recirc Loop is Not Too Long or Restrictive.
Assure Check Valves are Low Cracking Pressure & There is No Pressure Regulator In Recirc Loop
Is the Blower Activating?
Yes
No
Check Set Temperature.
Check 12 VDC To Blower Relay From Control Board. If No Power Replace Control Board.
Check for 110 VAC From Relay to Blower. If No Power, Replace Relay.
If There is Power To Blower, Check & Replace If Necessary.
See Bulletin(s) # 3, 10, 11
Is Flue Pipe Obstructed or Severe Negative Air Pressure in Flue?
Yes
Correct Obstruction or Solve Negative Air Problem.
No
Is Clear Tube Connected From Blower To Pressure Switch?
No
Yes
Tightly Connect Or Replace Tube.
Is There 12 VDC To the DSI Board From the Pressure Switch?
Yes
No
Does the DSI effect a 5 Second Spark?
Yes
No
Check WireFrom DSI To Ignition Probe.
Check Chassis Ground Connection.
Check & Adjust Spark Gap.
Replace DSI Board.
See Bulletin(s) # 5, 6
Is 12 VDC Power Supply Powering Control Board?
No
Check AC Plug To Power Supply
Check Power Supply Ground Connection
Check Connector To Board
Replace Power Supply
See Bulletin(s) #1
Yes
Is There a Red Service Code Flashing?
Yes
Refer To Service Code Bulletin
No
Be Sure Microprocessor is Tightly Seated in Socket.
Cycle Power To Board
If So, Replace Green Control Board.
See Bulletin(s) # 3
See Bulletin(s) # 2
Adjust Pressure Screw on Pressure Switch Until Burner Activates. Check Harness From Pressure Switch To DSI Board & Ground Connection.
Replace Pressure Switch Or Harness.
No
See Bulletin # 14
Be Sure Gas Supply is On & Pipe is Purged Of Air.
Assure Gas Pipe Is Adequately Sized & Proper Gas Pressure.
Yes
Does the Gas Valve Open?
Yes
No
Check 12 VDC Connection On Combination Gas Valve.
Check Ground Connection To Combination Gas Valve
Replace Harness Or Combination Gas Valve.
See Bulletin(s) # 12

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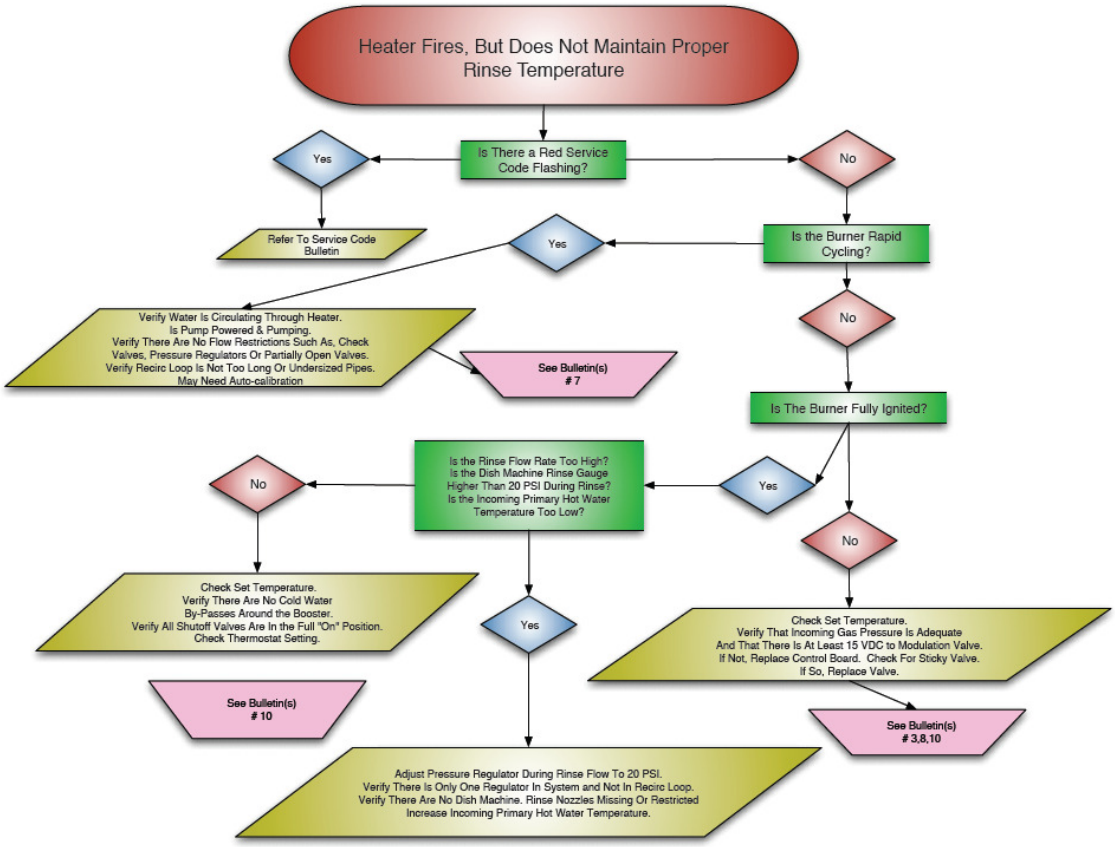
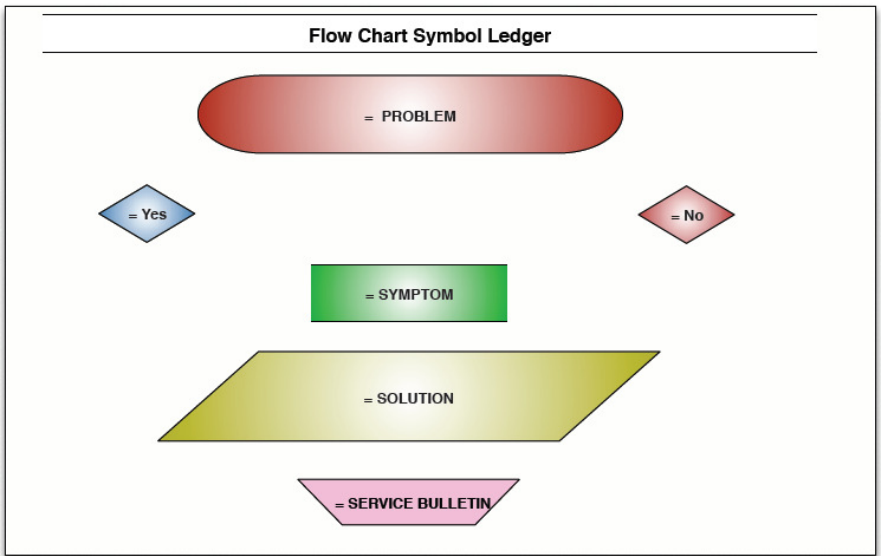
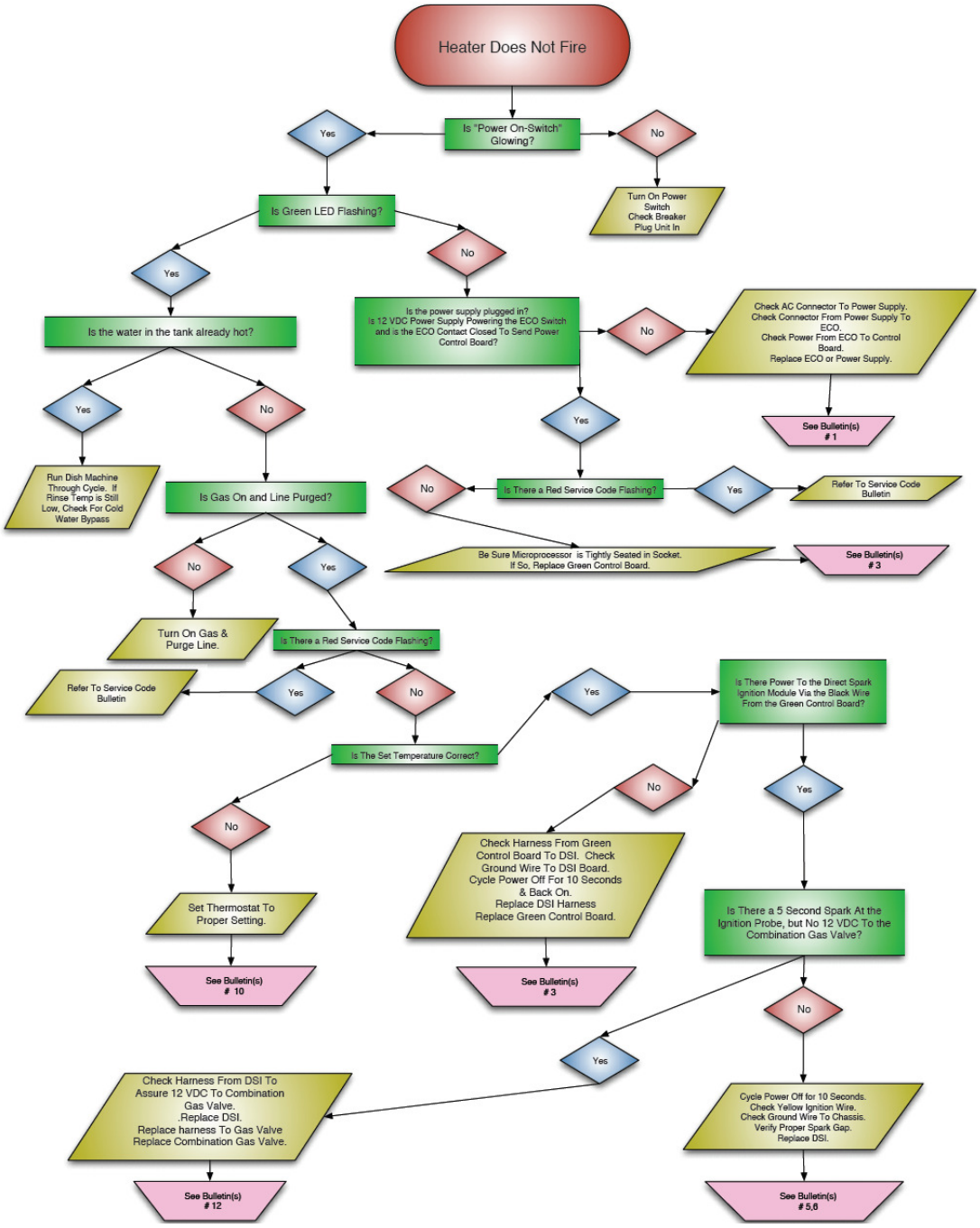
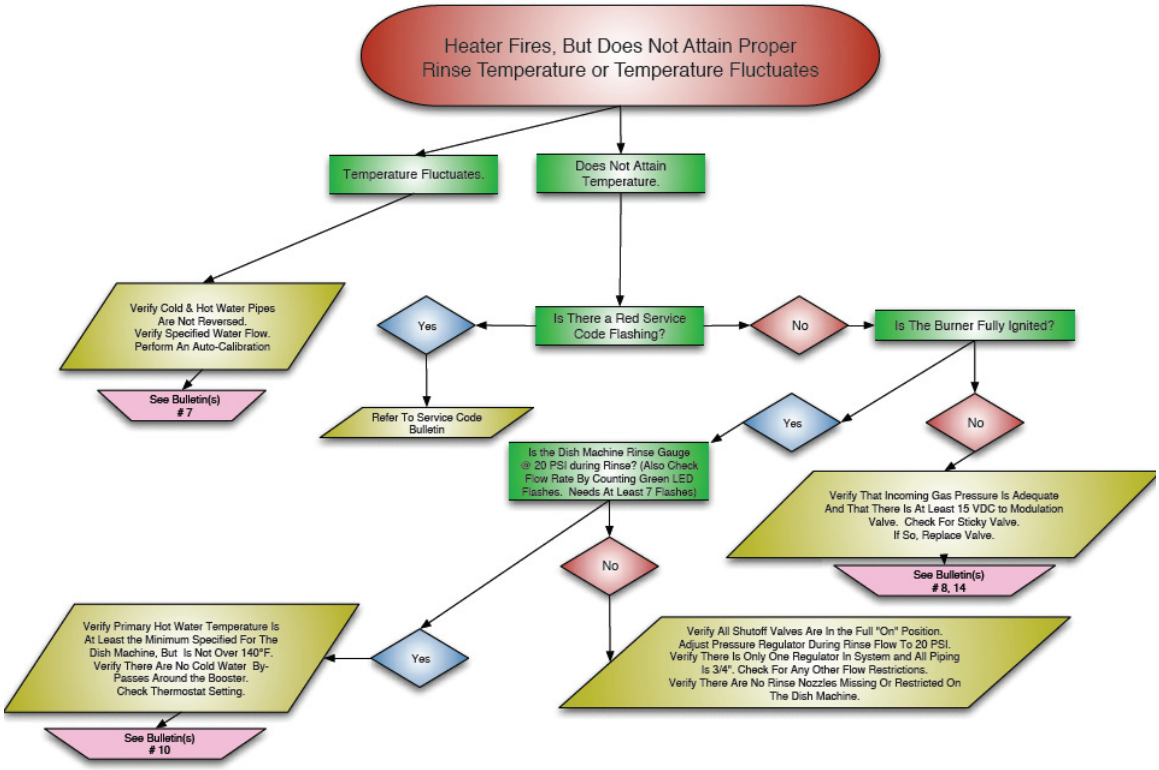
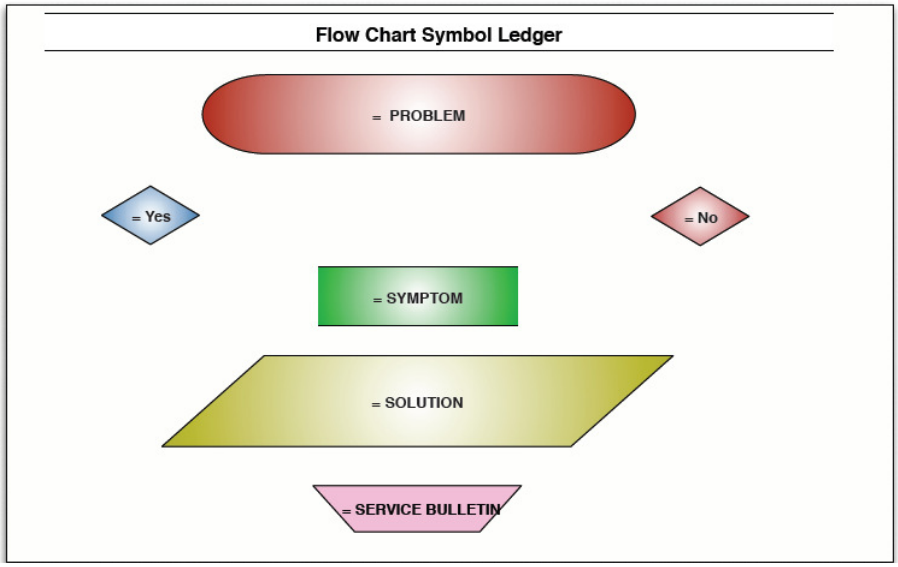

Heater Fires, But Does Not Maintain Proper Rinse Temperature
Is There a Red Service Code Flashing?
Yes
No
Refer To Service Code Bulletin
Is the Burner Rapid Cycling?
Yes
No
Verify Water Is Circulating Through Heater.
Is Pump Powered & Pumping.
Verify There Are No Flow Restrictions Such As, Check Valves, Pressure Regulators Or Partially Open Valves.
Verify Recirc Loop Is Not Too Long Or Undersized Pipes.
May Need Auto-calibration
See Bulletin(s) # 7
Is The Burner Fully Ignited?
Is the Rinse Flow Rate Too High?
Is the Dish Machine Rinse Gauge Higher Than 20 PSI During Rinse?
Is the Incoming Primary Hot Water Temperature Too Low?
Yes
No
No
Check Set Temperature.
Verify There Are No Cold Water By-Passes Around the Booster.
Verify All Shutoff Valves Are In the Full "On" Position.
Check Thermostat Setting.
Yes
Check Set Temperature.
Verify That Incoming Gas Pressure Is Adequate And That There Is At Least 15 VDC to Modulation Valve.
If Not, Replace Control Board. Check For Sticky Valve.
If So, Replace Valve.
See Bulletin(s) # 10
See Bulletin(s) # 3,8,10
Adjust Pressure Regulator During Rinse Flow To 20 PSI.
Verify There Is Only One Regulator In System and Not In Recirc Loop.
Verify There Are No Dish Machine. Rinse Nozzles Missing Or Restricted
Increase Incoming Primary Hot Water Temperature.


Flow Chart Symbol Ledger
= PROBLEM
= Yes
= No
= SYMPTOM
= SOLUTION
= SERVICE BULLETIN


Heater Does Not Fire
Is "Power On-Switch" Glowing?
Yes
No
Turn On Power Switch Check Breaker Plug Unit In
Is Green LED Flashing?
Yes
No
Is the water in the tank already hot?
Yes
No
Run Dish Machine Through Cycle. If Rinse Temp is Still Low, Check For Cold Water Bypass
Is Gas On and Line Purged?
No
Yes
Turn On Gas & Purge Line.
Is There a Red Service Code Flashing?
Refer To Service Code Bulletin
Yes
No
Is The Set Temperature Correct?
No
Set Thermostat To Proper Setting.
See Bulletin(s) # 10
Is the power supply plugged in? Is 12 VDC Power Supply Powering the ECO Switch and is the ECO Contact Closed To Send Power Control Board?
No
Check AC Connector To Power Supply. Check Connector From Power Supply To ECO. Check Power From ECO To Control Board. Replace ECO or Power Supply.
See Bulletin(s) # 1
Yes
Is There a Red Service Code Flashing?
No
Yes
Refer To Service Code Bulletin
Be Sure Microprocessor is Tightly Seated in Socket. If So, Replace Green Control Board.
See Bulletin(s) # 3
Yes
Is There Power To the Direct Spark Ignition Module Via the Black Wire From the Green Control Board?
No
Check Harness From Green Control Board To DSI. Check Ground Wire To DSI Board. Cycle Power Off For 10 Seconds & Back On. Replace DSI Harness Replace Green Control Board.
See Bulletin(s) # 3
Yes
Is There a 5 Second Spark At the Ignition Probe, but No 12 VDC To the Combination Gas Valve?
No
Cycle Power Off for 10 Seconds. Check Yellow Ignition Wire. Check Ground Wire To Chassis. Verify Proper Spark Gap. Replace DSI.
See Bulletin(s) # 5,6
Yes
Check Harness From DSI To Assure 12 VDC To Combination Gas Valve. .Replace DSI. Replace harness To Gas Valve Replace Combination Gas Valve.
See Bulletin(s) # 12


Heater Fires, But Does Not Attain Proper Rinse Temperature or Temperature Fluctuates
Temperature Fluctuates.
Does Not Attain Temperature.
Verify Cold & Hot Water Pipes Are Not Reversed. Verify Specified Water Flow. Perform An Auto-Calibration
See Bulletin(s) # 7
Yes
Is There a Red Service Code Flashing?
No
Is The Burner Fully Ignited?
Refer To Service Code Bulletin
Yes
No
Is the Dish Machine Rinse Gauge @ 20 PSI during Rinse? (Also Check Flow Rate By Counting Green LED Flashes. Needs At Least 7 Flashes)
Verify That Incoming Gas Pressure Is Adequate And That There Is At Least 15 VDC to Modulation Valve. Check For Sticky Valve. If So, Replace Valve.
See Bulletin(s) # 8, 14
No
Verify Primary Hot Water Temperature Is At Least the Minimum Specified For The Dish Machine, But Is Not Over 140°F. Verify There Are No Cold Water By-Passes Around the Booster. Check Thermostat Setting.
Yes
See Bulletin(s) # 10
Verify All Shutoff Valves Are In the Full "On" Position. Adjust Pressure Regulator During Rinse Flow To 20 PSI. Verify There Is Only One Regulator In System and All Piping Is 3/4". Check For Any Other Flow Restrictions. Verify There Are No Rinse Nozzles Missing Or Restricted On The Dish Machine.


Flow Chart Symbol Ledger
= PROBLEM
= Yes
= No
= SYMPTOM
= SOLUTION
= SERVICE BULLETIN

PT-200FT (Flow Through) and PT-200OR
Design and Sequence of Operation

The PT-200 tankless gas booster heater is designed as an on-demand water heater that ignites the burner when the ware washer rinse solenoid opens and water flows through the booster.

The PT-200FT is designed to be installed close to the dish machine. The National Sanitation Foundation stipulates that if a booster heater that is located further than five feet from the dishmachine, then it requires a recirculation system be fitted. This system recirculates the water between the outlet of the booster and the inlet to the dishmachine to prevent temperature loss below the required 180°F. For further information, see the page titled "PT-200RC (Recirculation) Design and Sequence of Operation".

The sequence of operation is as follows:

- Power is on, the power switch glows, and green LED on the control board flashes. The digital temperature readout is not displaying.
- The rinse solenoid of the warewasher opens and water flows through booster heater.

Note: The next steps take place in 3-5 seconds.

- The flow meter senses the water flow & sends a flow signal to the green control board.
- The green control board sends 12v DC through the brown wire to the pressure differential switch and on to the black solid-state relay that powers the power vent blower.
- The relay closes the 110v AC contacts to start the blower.
- Fluing is proofed by the clear vacuum tube that runs from the blower to the pressure differential switch.
- The pressure differential switch contacts close, sending 12v DC to the spark ignition module via the grey wire.
- The ignition module simultaneously affects a spark through the heavy yellow wire to the spark ignition probe over the burner and sends 12v DC to the combination gas valve via the blue wire. Ignition attempts lasts up to 5.5 seconds. The digital temperature read-out displays the outlet temperature.
- Ignition of the burner's center element is effected and the flame is proofed and monitored through the same yellow wire by the spark ignition module.
- The green control board sends DC voltage to the modulating gas valve for one second to effect flame cross-over to all burners.
- The micro-processor on the green control board monitors water flow with the flow meter and temperature with the three thermisters twice per second and varies voltage 0 – 22v DC to the gas modulating valve, varying gas flow to burner in order to maintain constant temperature output.
- Burner remains lit as long as the rinse solenoid is open, but if flame is extinguished for any reason, the gas valve will shut off in less than 1 second. Re-ignition will be attempted.
- When warewasher rinse solenoid closes and booster heater no longer senses flow, the booster heater reverts to standby mode and digital temperature readout turns off.

PT-200RC (Recirculating)
Design and Sequence of Operation

The PT-200RC gas booster heater is designed for use when a PT-200FT (Flow through) cannot be used. It is for use when the booster must be remotely located from the dishmachine. The National Sanitation Foundation requires any booster that is not located within 5 feet of the dishmachine must have a recirculation system installed. The PT-200RC system includes the booster heater, circulation pump, expansion tank, and holding tank.

The PT-200RC is an on-demand water heater. During operation, any time the T-mid thermister senses the water temperature drop below the factory set temperature, the burner ignites and heats the dish machine rinse water. This water is circulated by the pump through a recirculation line from the outlet of the booster, to the recirculation tank mounted near the dishmachine, then back to the booster. This provides constant hot water in the line and prevents temperature loss.

The sequence of operation is as follows:

- Power is on and the power switch glows and green LED flashes. The pump is circulating water from the booster to the tank and on to the dish machine and back to the booster.

Note: The next steps take place in 3-5 seconds.

- The T-mid thermister on the booster sense low water temperature and sends a flow signal to the control board.
- The green control board sends 12v DC through the brown wire to the pressure differential switch and on to the black solid-state relay that powers the power vent blower.
- The relay closes the 110v AC contacts to start the blower.
- Fluing is proofed by the clear vacuum tube that runs from the blower to the pressure differential switch.
- The pressure differential switch contacts close, sending 12v DC to the black spark ignition module via the grey wire.
- The ignition module simultaneously effects a spark through the high limit switch through the heavy yellow wire to the spark ignition probe over the burner and sends 12v DC to the combination gas valve via the blue wire. Two ignition attempts last up to a maximum of 5.5 seconds. The digital temperature read-out displays (if installed, otherwise, check temperature on spring gauges).
- Ignition of the burner's center element is effected and the flame is proofed and monitored through the same yellow wire by the spark ignition module.
- The micro-processor on the control board monitors water temperature with the T-mid thermisters twice per second and varies voltage 0 – 22v DC to the gas modulating valve, varying gas flow to burner in order to maintain constant temperature output.
- Burner will modulate down as tank temperature approaches set temperature.
- Burner remains lit as long as the water in the tank is below set temperature, but if flame is extinguished for any reason, the gas valve will shut off in less than 1 second and re-ignition will be attempted.

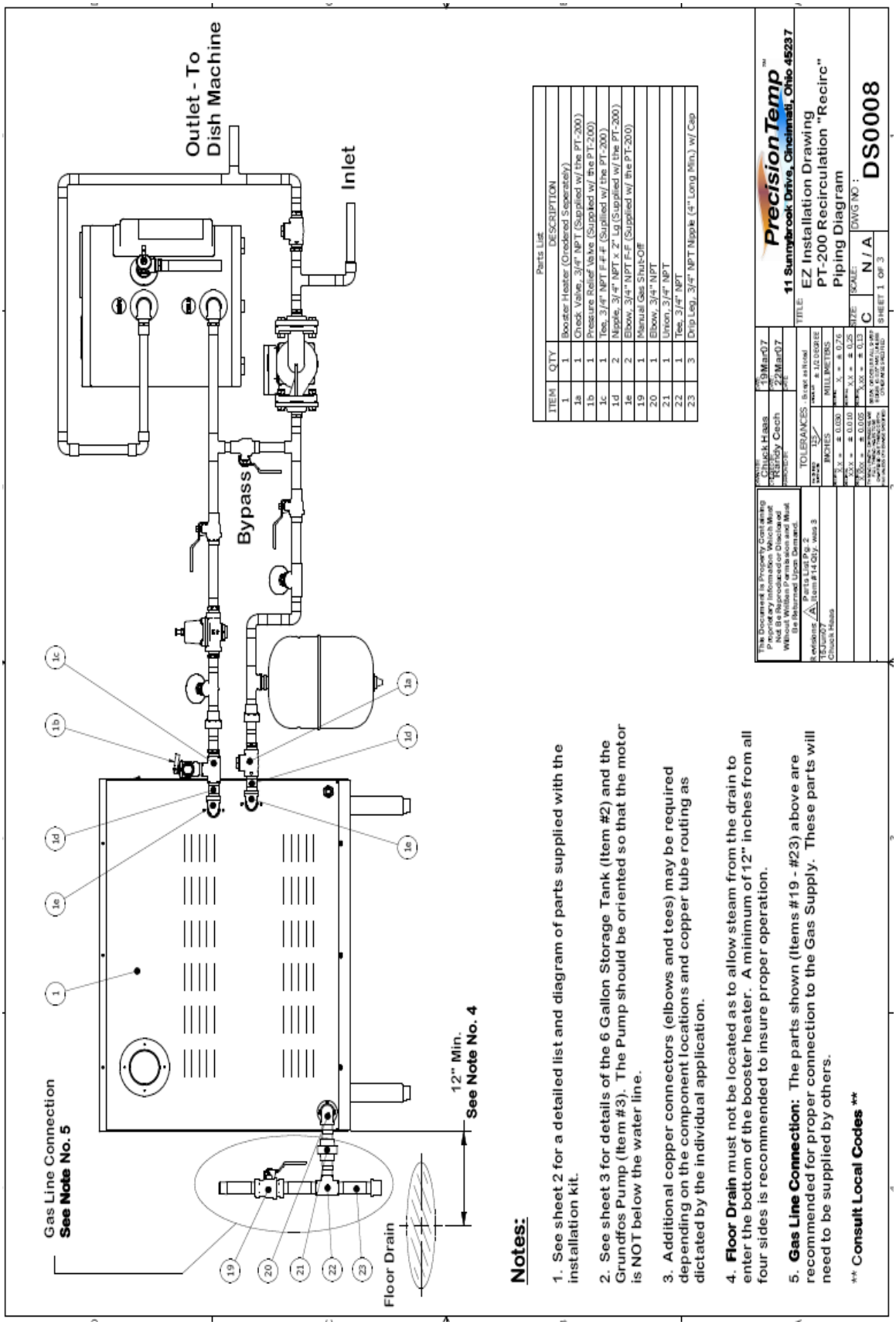
PT-56 Gas Booster Heater Sequence of Operation

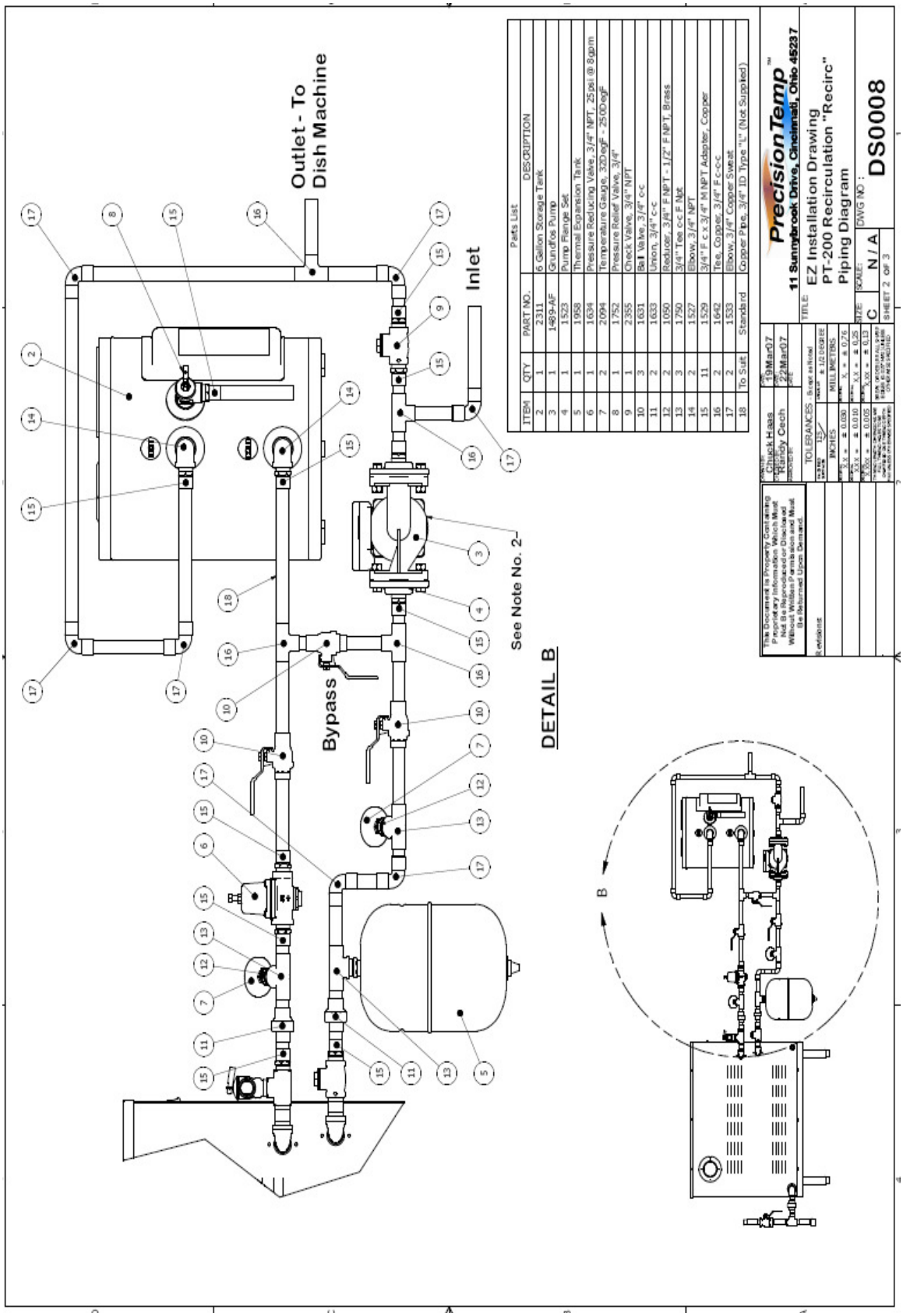
The PT-56 is an unvented gas booster heater designed to supply 180° final rinse water to a single rack door warewasher. The sequence of operation is as follows:

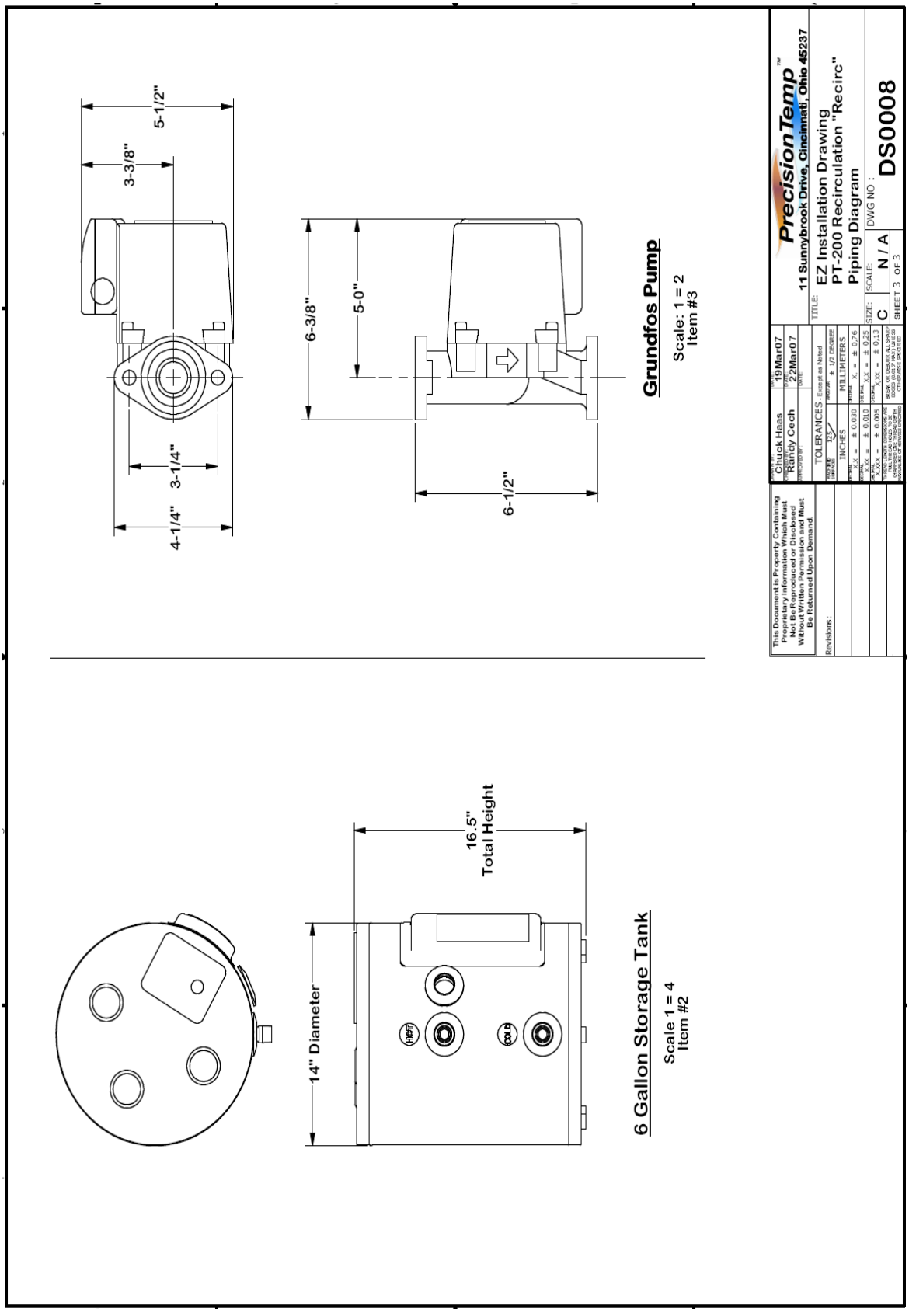
- Power is on, the **power switch glows** and the **green LED** flashes. The **re-circulating pump** draws cooler water from the bottom of the **stainless tank** and pumps it through the **copper heat exchanger**.
- The water from the **copper heat exchanger** returns to the **stainless tank** via the **tee fitting** in the top of the **stainless tank**.

Note: The next 5 steps take place in 3-5 seconds.

- If the **T-mid thermistor** senses the water temperature is below set temperature, it sends a signal to the **green control board.**
- The **green control board,** which is powered by the **12 VDC converter,** sends 12 VDC through the black wire to the **spark ignition module**.
- The **Ignition module** simultaneously effects a spark through the **heavy yellow wire** to the **spark ignition probe** over the **burner** and sends 12 VDC to the **combination gas valve** via the blue and white wire. (Up to three ignition attempts lasting up to 5.5 seconds max each).
- Ignition of the burner's center element is effected and the flame is proofed and monitored through the same **yellow wire** to the **ignition module**.
- The **green control board** sends 12 VDC via the back & white wire to the **modulating gas valve** for one second to effect flame cross-over.
- The micro-processor on the **green control board** monitors water temperature with the **T-mid thermistor** twice / second and varies voltage 0 –12 VDC to the **gas modulating valve** in order to maintain constant temperature output.
- As the water in the **stainless tank** approaches set temperature, the gas flow is cut back by the **modulating gas valve** by reducing the DC voltage to the valve down to 0 volts. This is by-pass (low) gas flow.
- **Burner** remains lit until set temperature of the circulating water is reached. This is sensed by the **T-mid thermistor** and the burner is shut off. Note: If the flame is extinguished for any reason, the **combination gas valve** will shut off is less than 1 second and re-ignition will be attempted.
- When the rinse solenoid of the warewasher opens, rinse water flows from the **tee fitting** in the top of the **stainless tank** through the fitting on the bottom of the heater to the warewasher. Cooler make-up water enters through the bottom tank fitting.
- Burner will cycle on and off as the warewasher draws hot rinse water from the **stainless tank**.


Outlet - To Dish Machine
Inlet
Bypass
Gas Line Connection
See Note No. 5
12" Min.
See Note No. 4
Floor Drain
Notes:
1. See sheet 2 for a detailed list and diagram of parts supplied with the installation kit.
2. See sheet 3 for details of the 6 Gallon Storage Tank (Item #2) and the Grundfos Pump (Item #3). The Pump should be oriented so that the motor is NOT below the water line.
3. Additional copper connectors (elbows and tees) may be required depending on the component locations and copper tube routing as dictated by the individual application.
4. Floor Drain must not be located as to allow steam from the drain to enter the bottom of the booster heater. A minimum of 12" inches from all four sides is recommended to insure proper operation.
5. Gas Line Connection: The parts shown (Items #19 - #23) above are recommended for proper connection to the Gas Supply. These parts will need to be supplied by others.
** Consult Local Codes **
Parts List
ITEM QTY DESCRIPTION
1 1 Booster Heater (Ordered Seperately)
1a 1 Check Valve, 3/4" NPT (Supplied w/ the PT-200)
1b 1 Pressure Relief Valve (Supplied w/ the PT-200)
1c 1 Tee, 3/4" NPT F-F-F (Supllied w/ the PT-200)
1d 2 Nipple, 3/4" NPT x 2" Lg (Supplied w/ the PT-200)
1e 2 Elbow, 3/4" NPT F-F (Supplied w/ the PT-200)
19 1 Manual Gas Shut-Off
20 1 Elbow, 3/4" NPT
21 1 Union, 3/4" NPT
22 1 Tee, 3/4" NPT
23 3 Drip Leg, 3/4" NPT Nipple (4" Long Min.) w/ Cap
PrecisionTemp
11 Sunnybrook Drive, Cincinnati, Ohio 45237
EZ Installation Drawing
PT-200 Recirculation "Recirc"
Piping Diagram
DS0008


Outlet - To Dish Machine
Inlet
Bypass
See Note No. 2
DETAIL B
B
Parts List
ITEM QTY PART NO. DESCRIPTION
2 1 2311 6 Gallon Storage Tank
3 1 1469-AF Grundfos Pump
4 1 1523 Pump Flange Set
5 1 1958 Thermal Expansion Tank
6 1 1634 Pressure Reducing Valve, 3/4" NPT, 25psi @ 8gpm
7 2 2094 Temperature Gauge, 32Deg F - 250Deg F
8 1 1752 Pressure Relief Valve, 3/4"
9 1 2355 Check Valve, 3/4" NPT
10 3 1631 Ball Valve, 3/4" c-c
11 2 1633 Union, 3/4" c-c
12 2 1060 Reducer, 3/4" FNPT - 1/2" FNPT, Brass
13 3 1790 3/4" Tee c-c F Npt
14 2 1527 Elbow, 3/4" NPT
15 11 1529 3/4" F c x 3/4" M NPT Adapter, Copper
16 2 1642 Tee, Copper, 3/4" F c-c-c
17 2 1533 Elbow, 3/4" Copper Sweat
18 To Suit Standard Copper Pipe, 3/4" ID Type "L" (Not Supplied)
PrecisionTemp
11 Sunnybrook Drive, Cincinnati, Ohio 45237
TITLE:
EZ Installation Drawing
PT-200 Recirculation "Recirc"
Piping Diagram
SIZE: C
SCALE: N / A
DWG NO: DS0008
SHEET 2 OF 3
Chuck Haas 19Mar07
Randy Cech 22Mar07
TOLERANCES:
INCHES
MILLIMETERS
Revisions


5-1/2"
3-3/8"
3-1/4"
4-1/4"
6-3/8"
5-0"
6-1/2"
Grundfos Pump
Scale: 1 = 2
Item #3
16.5"
Total Height
14" Diameter
6 Gallon Storage Tank
Scale 1 = 4
Item #2
PrecisionTemp
11 Sunnybrook Drive, Cincinnati, Ohio 45237
EZ Installation Drawing
PT-200 Recirculation "Recirc"
Piping Diagram
DS0008
Chuck Haas
Randy Cech
19Mar07
22Mar07
TOLERANCES - Except as Noted
INCHES
MILLIMETERS
SIZE: C
SCALE: N / A
SHEET 3 OF 3
Revisions:
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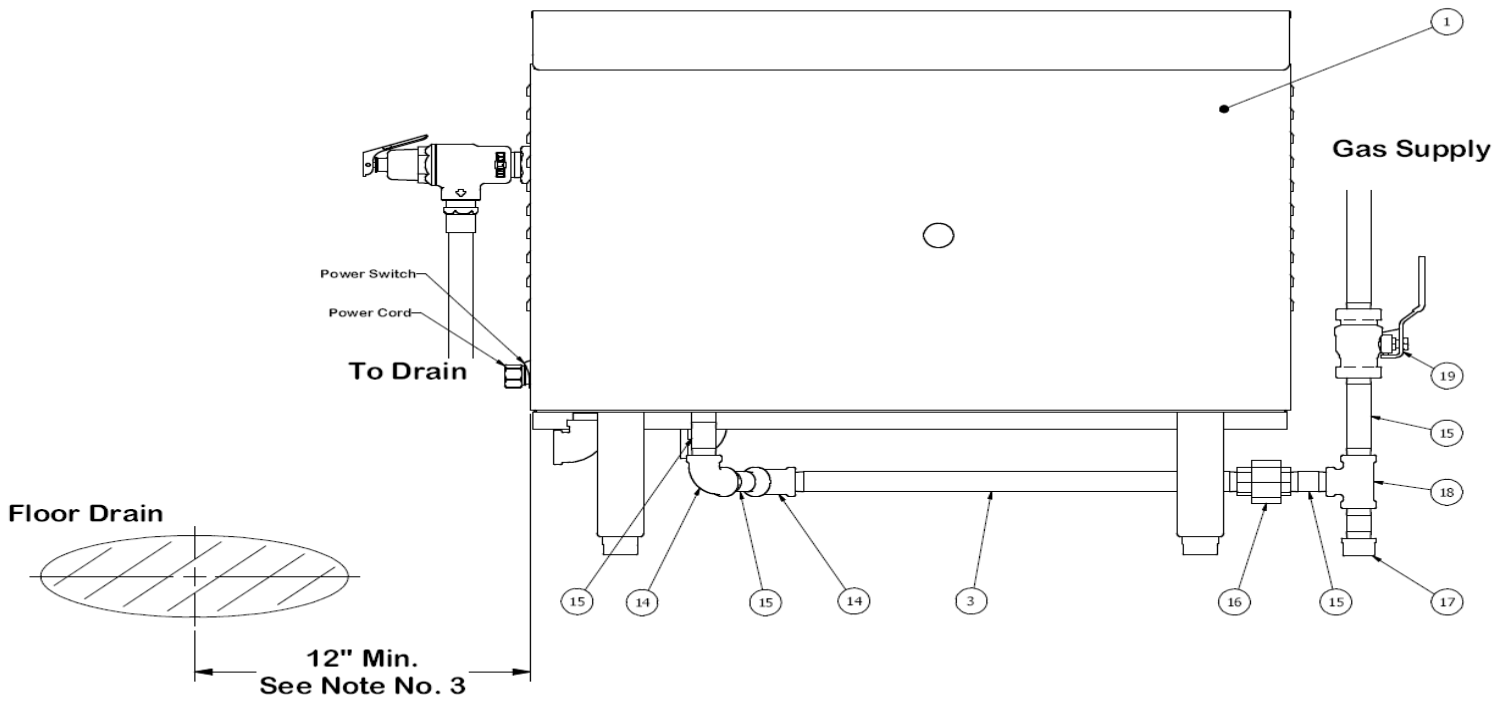
Front View



Parts List		
ITEM	QTY	DESCRIPTION
1	1	PT-56 Booster Heater (Ordered Seperately)
14	2	Elbow 45Deg, 1/2" NPT
15	6	Nipple, 1/2" NPT (Various Lengths to Suit)
16	1	Union, 1/2" NPT
17	1	Drip Leg, 1/2" NPT Nipple (4" Long Min.) w/ Cap
18	1	Tee, 1/2" NPT F-F-F
19	1	Manual Gas Shut-Off

Notes:

1. See Sheet 2 for a detailed list and diagram of parts supplied with the installation kit.

2. **Gas Line Connection:** The parts shown (Items #14 - #19) above are recommended for proper connection to the Gas Supply. These parts will need to be supplied by others.

3. **Floor Drain** must not be located as to allow steam from the drain to enter the bottom of the booster heater. A minimum of 12" inches from all four sides is recommended to insure proper operation.

** **Consult Local Codes** **

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Revisions:

DRAWN BY: Chuck Haas	DATE: 19Jun07	
ENGINEER: Randy Cech	DATE: 19Jun07	
APPROVED: G. Wulfmeyer	DATE: 19Jun07	
TOLERANCES - Except as Noted		
MACHINED SURFACES 125	ANGULAR ± 1/2 DEGREE	
INCHES	MILLIMETERS	
DECIMAL X.X = ± 0.030	DECIMAL X, = ± 0,76	
DECIMAL .XX = ± 0.010	DECIMAL X,X = ± 0,25	
DECIMAL .XXX = ± 0.005	DECIMAL X,XX = ± 0,13	
THREAD LENGTH DIMENSIONS ARE FULL THREAD HOLES TO BE UNSPECIFIED ONE THREAD DEPTH AND UNLESS OTHERWISE SPECIFIED	BREAK OR DEBURR ALL SHARP EDGES (0.015" MAX) UNLESS OTHERWISE SPECIFIED	

PrecisionTemp™
11 Sunnybrook Drive, Cincinnati, Ohio 45237

TITLE: EZ Installation Drawing
PT-56 Booster Heater
Gas Line Connection

SIZE: C | SCALE: N / A | DWG NO : DS0012

SHEET 1 OF 2

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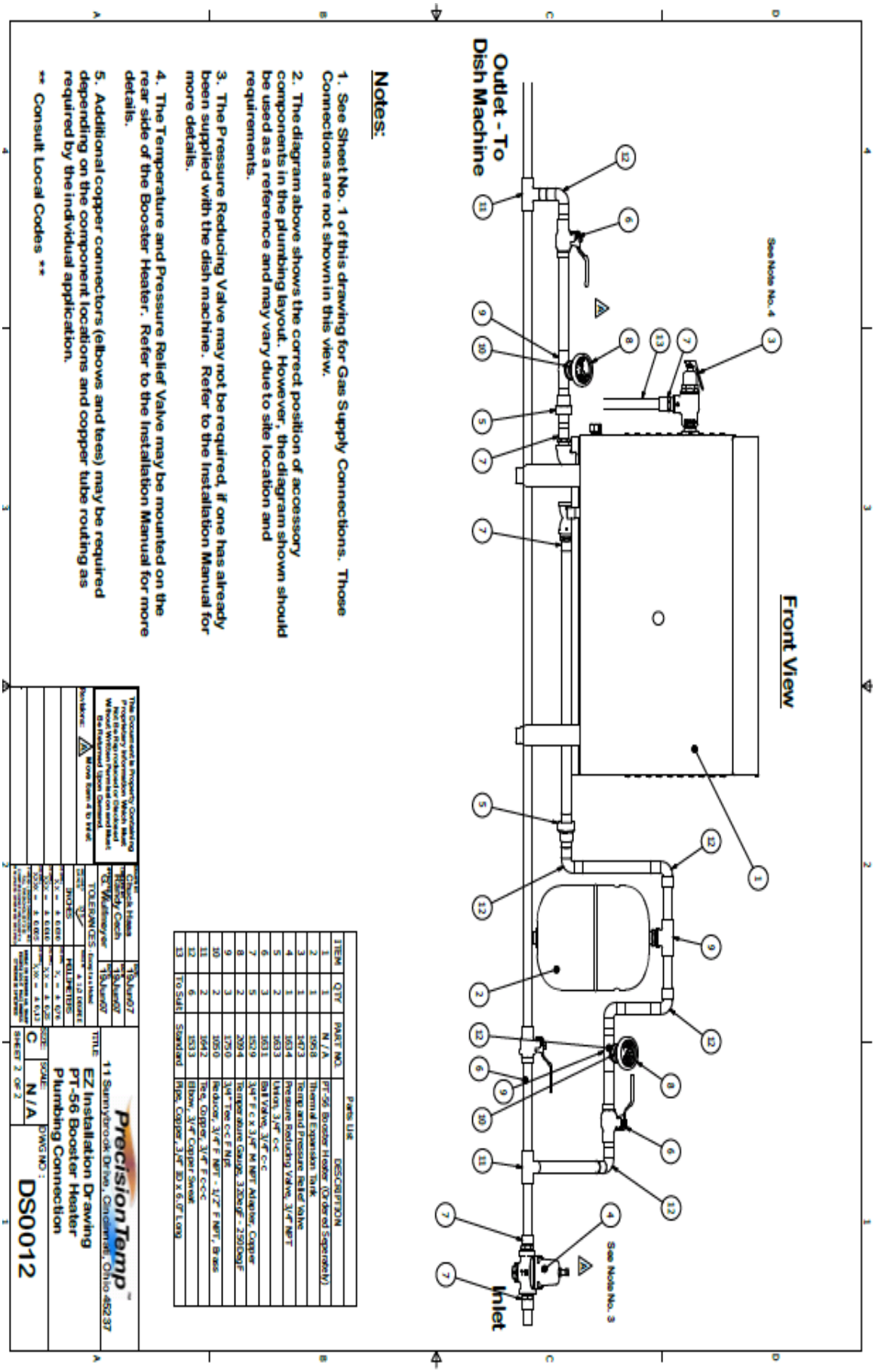

Notes:

1. See Sheet No. 1 of this drawing for Gas Supply Connections. Those Connections are not shown in this view.
2. The diagram above shows the correct position of accessory components in the plumbing layout. However, the diagram shown should be used as a reference and may vary due to site location and requirements.
3. The Pressure Reducing Valve may not be required, if one has already been supplied with the dish machine. Refer to the Installation Manual for more details.
4. The Temperature and Pressure Relief Valve may be mounted on the rear side of the Booster Heater. Refer to the Installation Manual for more details.
5. Additional copper connectors (elbows and tees) may be required depending on the component locations and copper tube routing as required by the individual application.

** Consult Local Codes **

ITEM	QTY	PART NO.	Parts List DESCRIPTION
1	1	N / A	PT-56 Booster Heater (Ordered Separately)
2	1	3968	Thermal Expansion Tank
3	1	3473	Temp and Pressure Relief Valve
4	1	3614	Pressure Reducing Valve, 3/4" NPT
5	2	3633	Union, 3/4" c-c
6	3	3631	Ball Valve, 3/4" c-c
7	5	3529	3/4" F c x 3/4" M NPT Adapter, Copper
8	2	2094	Temperature Gauge, 3.25in[F - 250DegF
9	3	1750	3/4" Tee c-c-F NPT
10	2	1050	Reducer, 3/4"-F NPT - 1/2" F NPT, Brass
11	2	3642	Tee, Copper, 3/4" F c-c-c
12	6	3533	Elbow, 3/4" Copper Sweat
13	Ref	Standard	Pipe, Copper, 3/4" ID x 6.0ft Long

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Drawn: Chuck Hines 10Jun07
Checked: Randy Cecil 10Jun07
Engineer: C.T. Williamyer 10Jun07

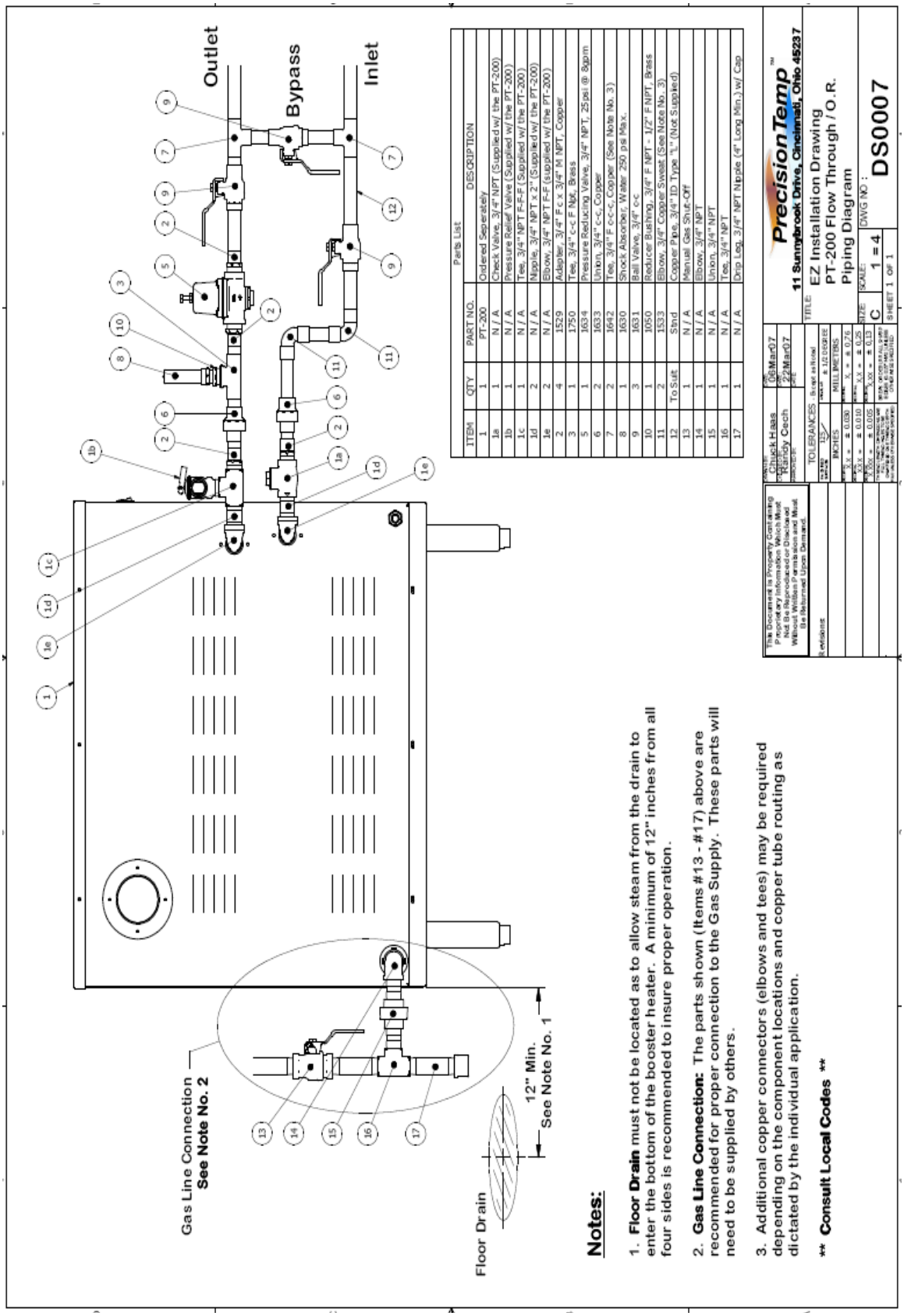
Revisions: Minor Edits to Detail

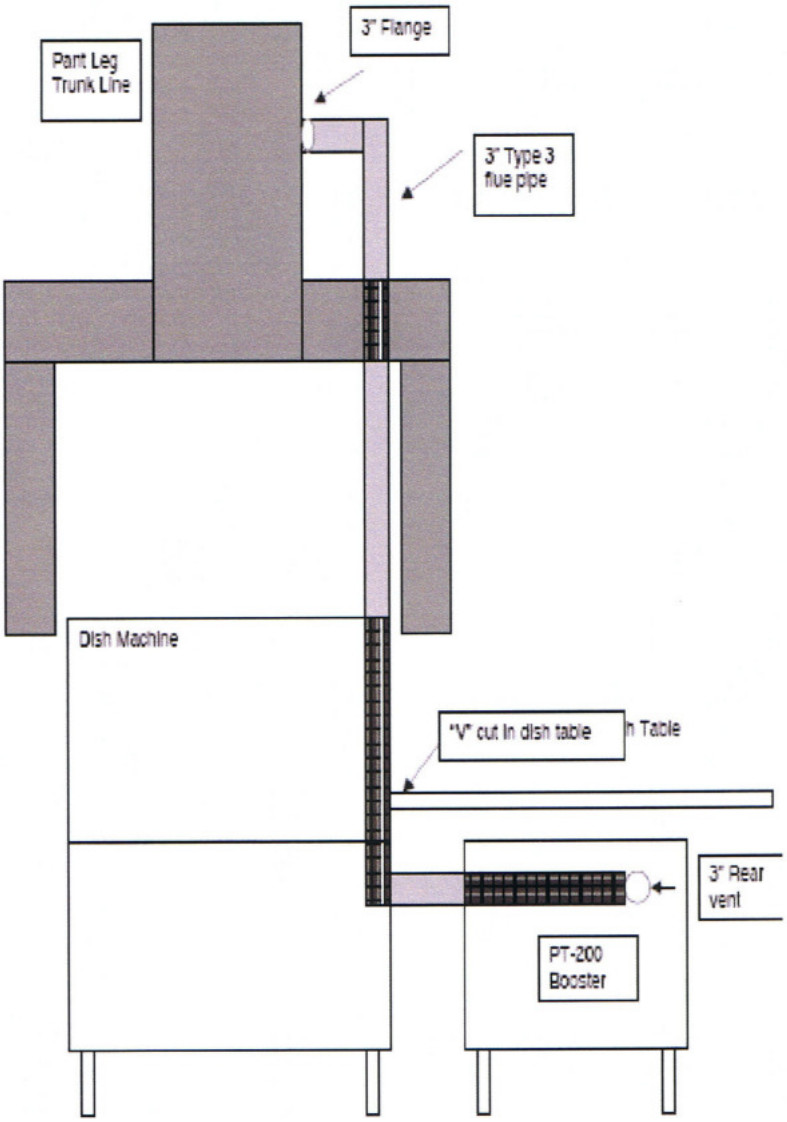
TOLERANCES: (Unless Noted)
FRACT ± 1/2 (0.06)
DECIMALS
.XX = ± 0.06
.XXX = ± 0.030
.XXXX = ± 0.015
ANGLES ± 1°
NOTES

PrecisionTemp™
11 Sunnybrook Drive, Cincinnati, Ohio 45237

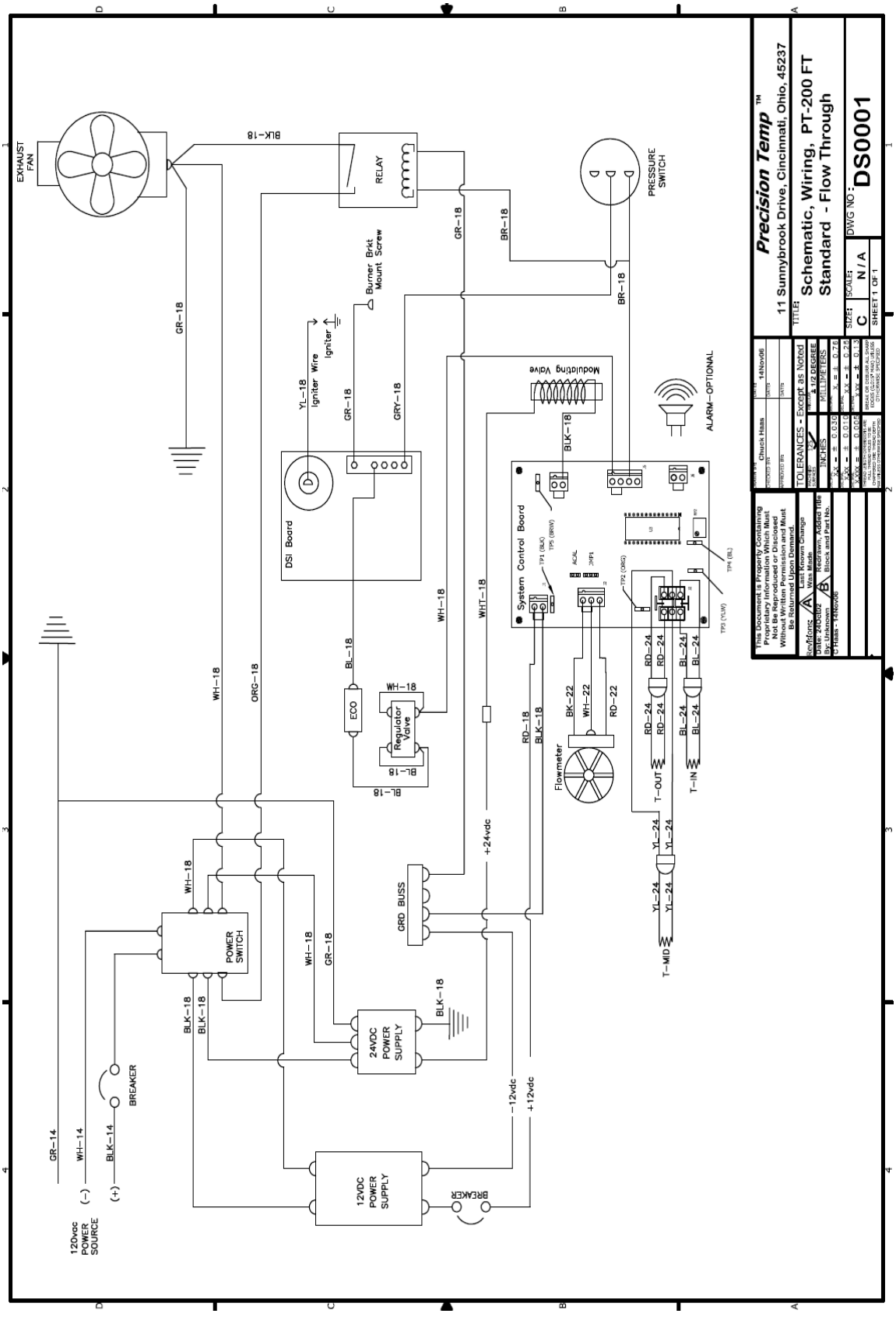
TITLE: EZ Installation Drawing
PT-56 Booster Heater
Plumbing Connection

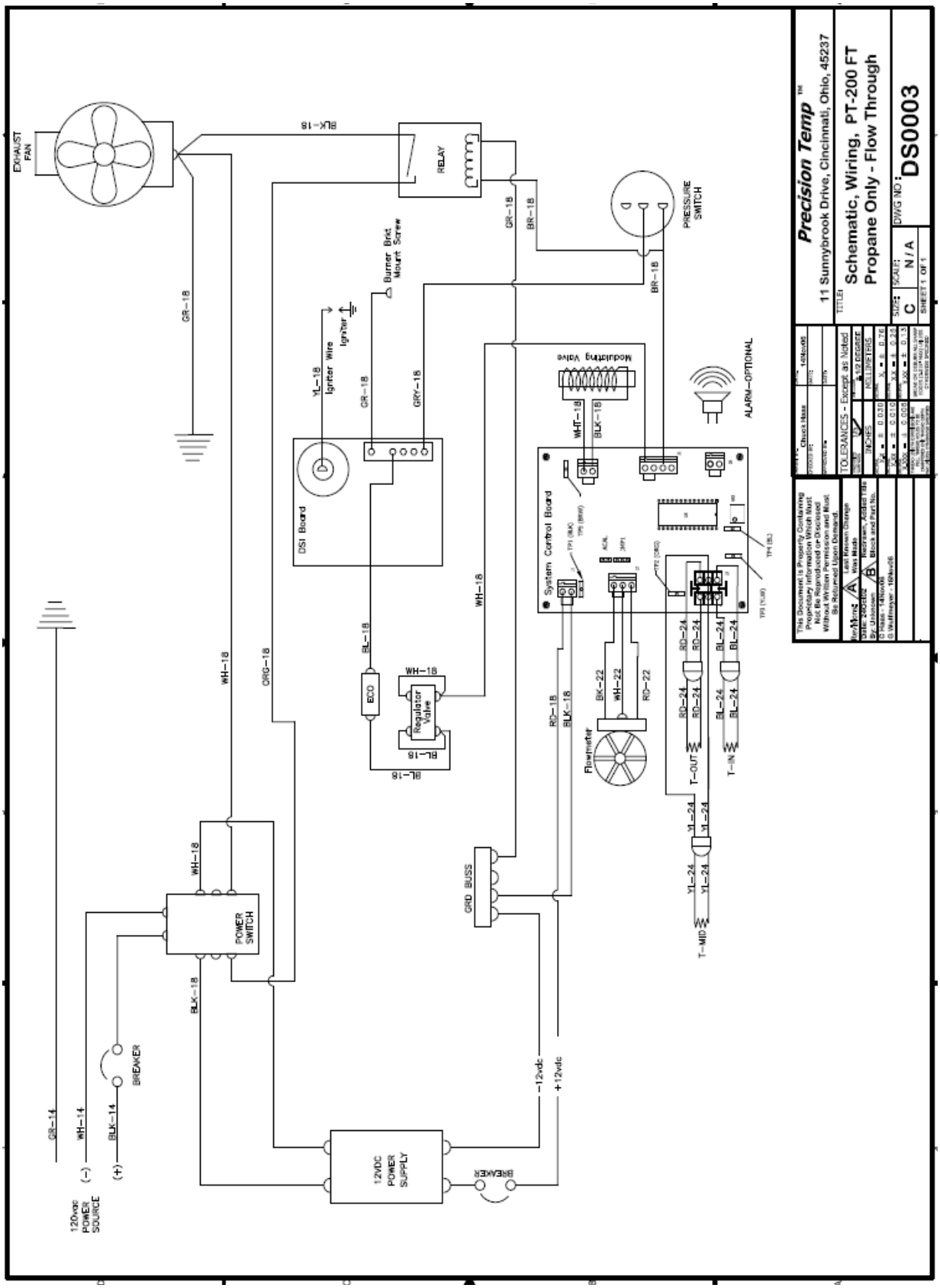
SIZE: C
SCALE: N / A
SHEET 2 OF 2
DWG NO: DS0012

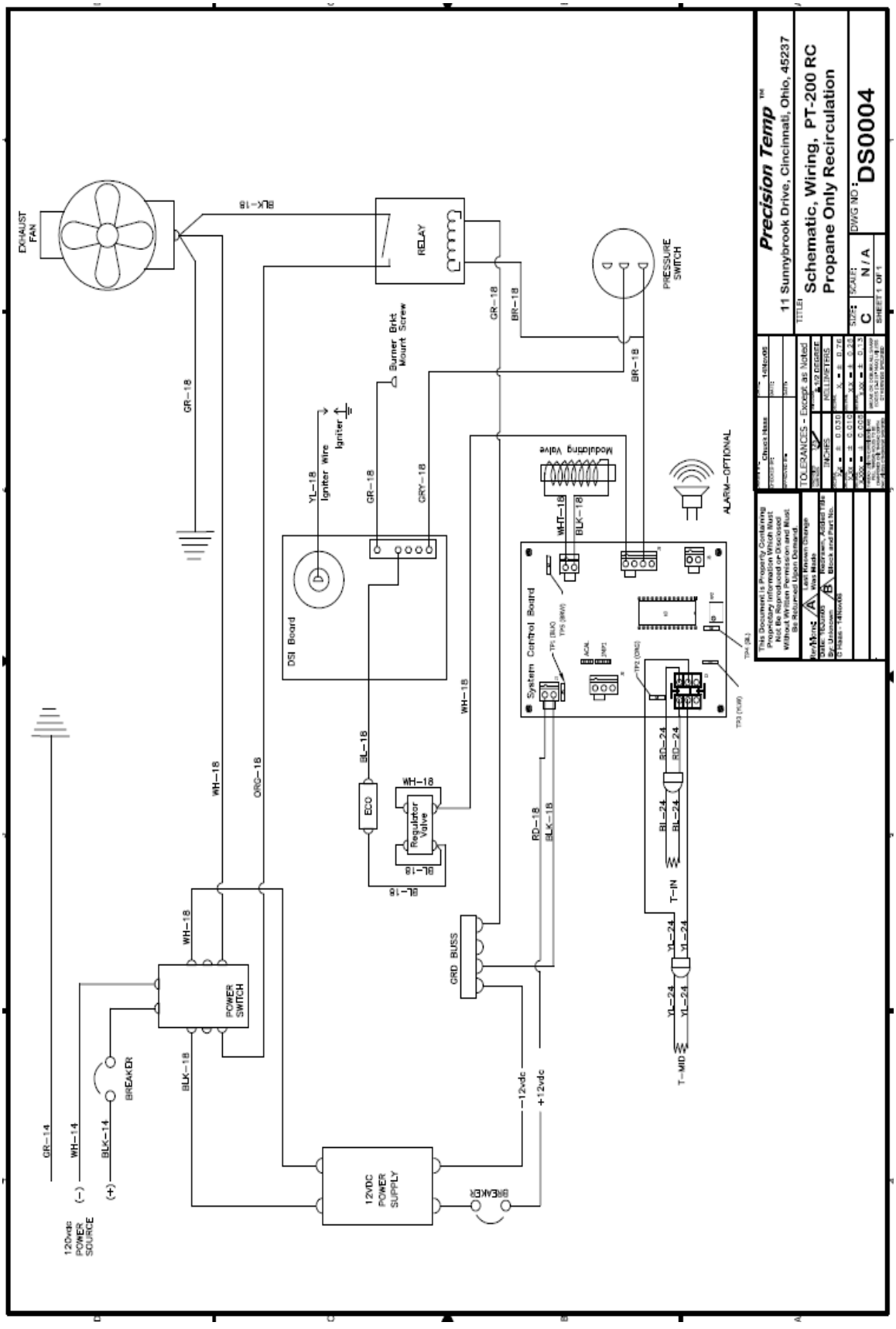

Outlet
Bypass
Inlet
Gas Line Connection
See Note No. 2
12" Min.
See Note No. 1
Floor Drain
Parts List
ITEM QTY PART NO. DESCRIPTION
1 1 PT-200 Ordered Seperately
1a 1 N / A Check Valve, 3/4" NPT (Supplied w/ the PT-200)
1b 1 N / A Pressure Relief Valve (Supplied w/ the PT-200)
1c 1 N / A Tee, 3/4" NPT F-F-F (Supplied w/ the PT-200)
1d 2 N / A Nipple, 3/4" NPT x 2" (Supplied w/ the PT-200)
1e 2 N / A Elbow, 3/4" NPT F-F (supplied w/ the PT-200)
2 4 1529 Adapter, 3/4" F c x 3/4" M NPT, Copper
3 1 1750 Tee, 3/4" c-c F Npt, Brass
5 1 1634 Pressure Reducing Valve, 3/4" NPT, 25psi @ 8gpm
6 2 1633 Union, 3/4" c-c, Copper
7 2 1642 Tee, 3/4" F c-c-c, Copper (See Note No. 3)
8 1 1630 Shock Absorber, Water 250 psi Max.
9 3 1631 Ball Valve, 3/4" c-c
10 1 1050 Reducer Bushing, 3/4" F NPT - 1/2" F NPT, Brass
11 2 1533 Elbow, 3/4" Copper Sweat (See Note No. 3)
12 To Suit Stnd Copper Pipe, 3/4" ID Type "L" (Not Supplied)
13 1 N / A Manual Gas Shut-Off
14 1 N / A Elbow, 3/4" NPT
15 1 N / A Union, 3/4" NPT
16 1 N / A Tee, 3/4" NPT
17 1 N / A Drip Leg, 3/4" NPT Nipple (4" Long Min.) w/ Cap
Notes:
1. Floor Drain must not be located as to allow steam from the drain to enter the bottom of the booster heater. A minimum of 12" inches from all four sides is recommended to insure proper operation.
2. Gas Line Connection: The parts shown (Items #13 - #17) above are recommended for proper connection to the Gas Supply. These parts will need to be supplied by others.
3. Additional copper connectors (elbows and tees) may be required depending on the component locations and copper tube routing as dictated by the individual application.
** Consult Local Codes **
PrecisionTemp
11 Sunnybrook Drive, Cincinnati, Ohio 45237
EZ Installation Drawing
PT-200 Flow Through / O.R.
Piping Diagram
DS0007

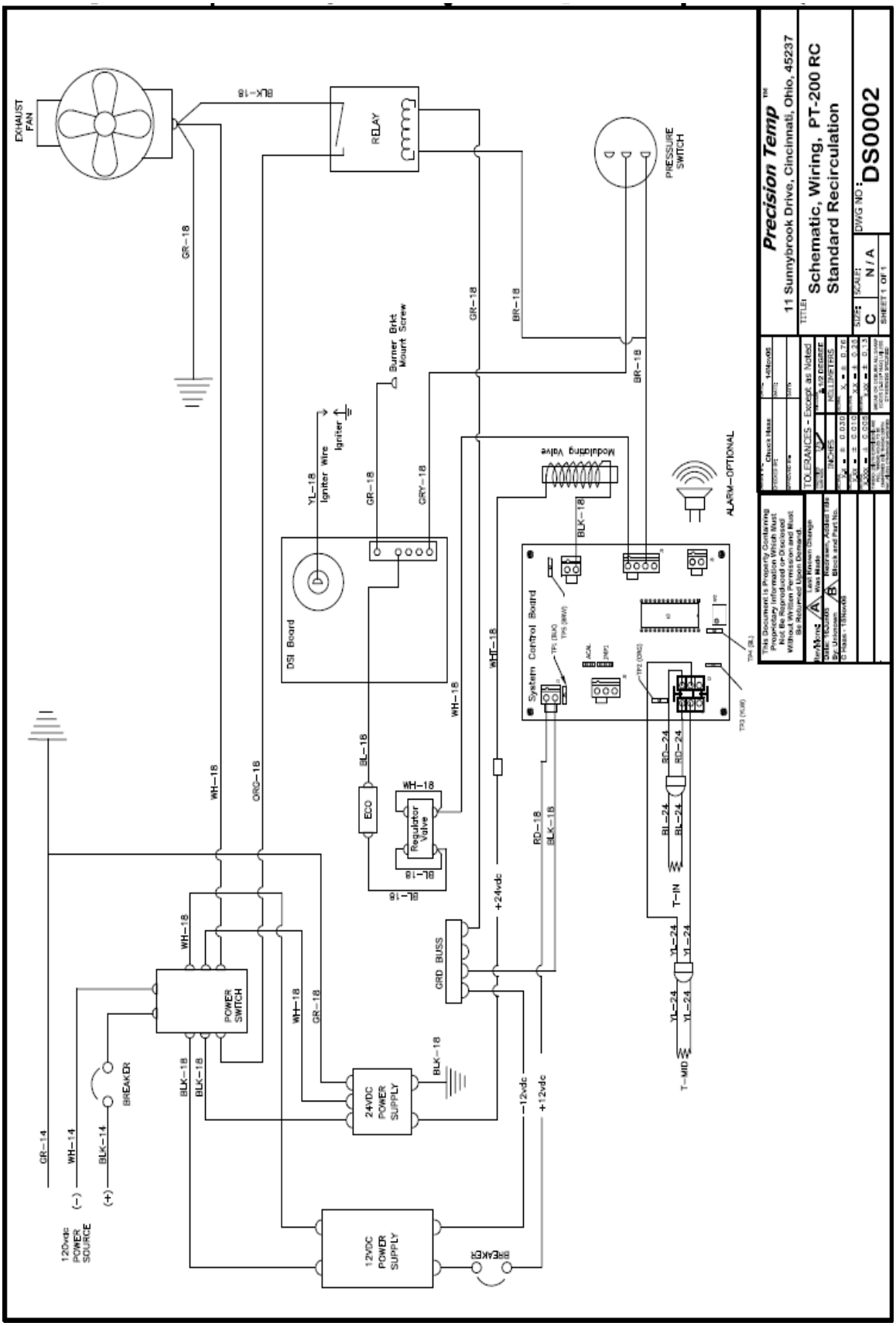


3" Flu is run from the rear flue hook-up of PT-200 & directed up through the dish table V cut and physically connects to the trunk line of the Pant Leg. The Pant Leg venerator should be electrically interlocked with the dish machine.


EXHAUST FAN
RELAY
PRESSURE SWITCH
Burner Brkt Mount Screw
Igniter Wire
Igniter
DSI Board
Modulating Valve
ALARM-OPTIONAL
System Control Board
ECO
Regulator Valve
Flowmeter
GRD BUSS
POWER SWITCH
24VDC POWER SUPPLY
12VDC POWER SUPPLY
BREAKER
120vac POWER SOURCE
+24vdc
+12vdc
-12vdc
T-OUT
T-IN
T-MID
Precision Temp ™
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
TITLE:
Schematic, Wiring, PT-200 FT
Standard - Flow Through
SIZE: C
SCALE: N/A
DWG NO: DS0001
SHEET 1 OF 1


Precision Temp
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
Schematic, Wiring, PT-200 FT
Propane Only - Flow Through
DWG NO: DS0003
SIZE: C
SCALE: N / A
SHEET 1 OF 1
EXHAUST FAN
RELAY
PRESSURE SWITCH
Burner Brkt Mount Screw
Igniter Wire
Igniter
Modulating Valve
ALARM-OPTIONAL
DSI Board
System Control Board
ECO
Regulator Valve
Flowmeter
T-OUT
T-IN
T-MID
GRD BUSS
POWER SWITCH
BREAKER
12VDC POWER SUPPLY
120vac POWER SOURCE
(-)
(+)
-12vdc
+12vdc
BLK-18
WH-18
GR-18
BR-18
YL-18
GRY-18
ORG-18
BL-18
RD-18
BLK-16
BK-22
WH-22
RD-22
RD-24
BL-24
YL-24
GR-14
WH-14
BLK-14


Precision Temp
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
Schematic, Wiring, PT-200 RC
Propane Only Recirculation
DWG NO: DS0004
SIZE: C
SCALE: N/A
SHEET 1 OF 1
EXHAUST FAN
RELAY
PRESSURE SWITCH
Burner Brkt Mount Screw
Igniter
Igniter Wire
DSI Board
Modulating Valve
ALARM-OPTIONAL
System Control Board
ECO
Regulator Valve
GRD BUSS
POWER SWITCH
BREAKER
12VDC POWER SUPPLY
120vdc POWER SOURCE
T-IN
T-MID
BLK-18
GR-18
WH-18
ORG-18
BR-18
GRY-18
YL-18
BL-18
RD-18
WHT-18
BLK-14
WH-14
GR-14
BL-24
RD-24
YL-24
-12vdc
+12vdc


Precision Temp
11 Sunnybrook Drive, Cincinnati, Ohio, 45237
Schematic, Wiring, PT-200 RC
Standard Recirculation
DWG NO: DS0002
SIZE: C
SCALE: N/A
SHEET 1 OF 1
EXHAUST FAN
RELAY
PRESSURE SWITCH
Burner Brkt Mount Screw
Igniter Wire
Igniter
DSI Board
Modulating Valve
ALARM-OPTIONAL
System Control Board
ECO
Regulator Valve
POWER SWITCH
24VDC POWER SUPPLY
12VDC POWER SUPPLY
GRD BUSS
BREAKER
120vdc POWER SOURCE
T-IN
T-MID
+24vdc
+12vdc
-12vdc
GR-18
WH-18
BLK-18
BR-18
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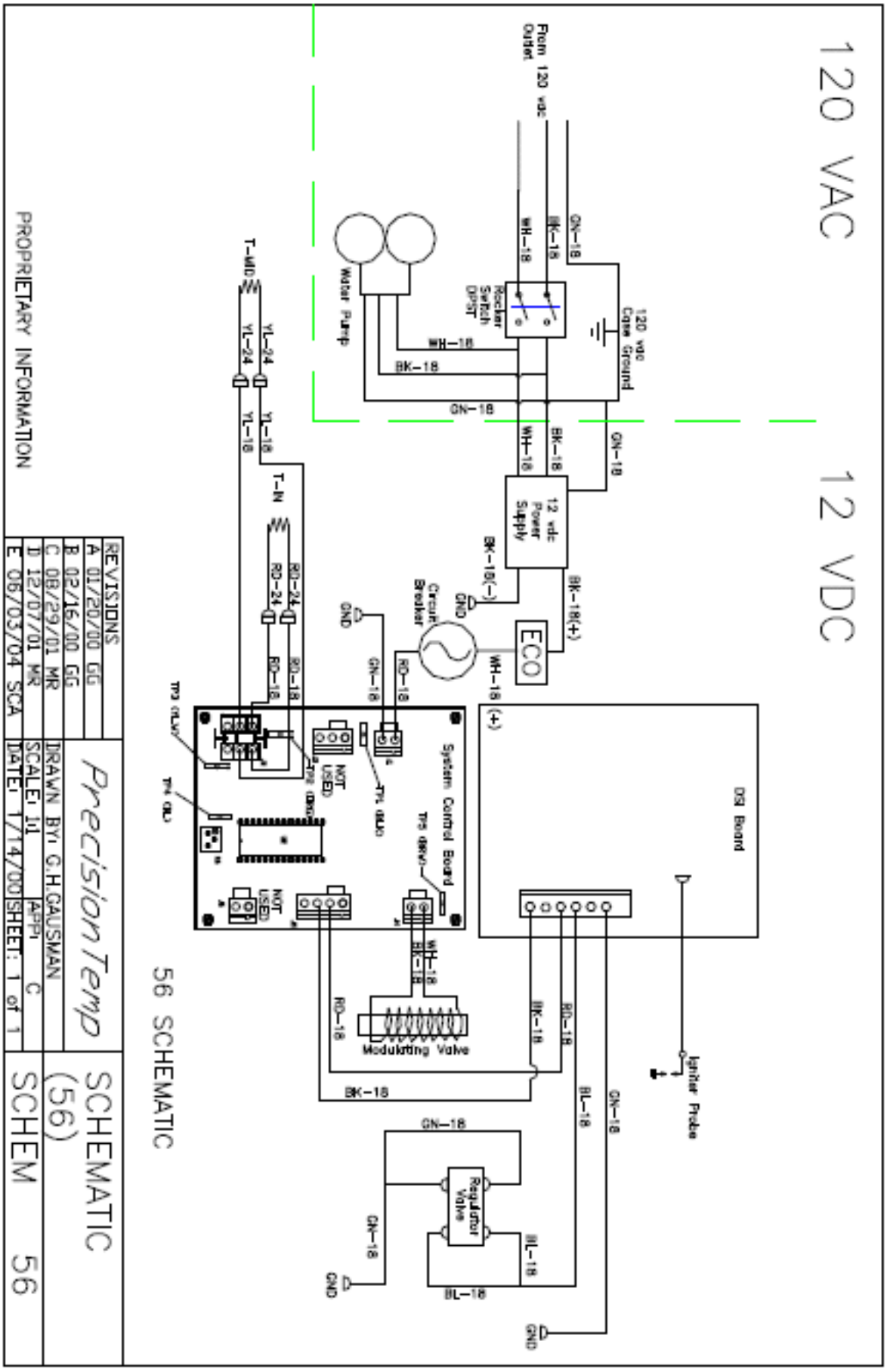
BL-24
RD-24
YL-24


120 VAC
12 VDC
From 120 vac Outlet
GN-18
BK-18
WH-18
Rocker Switch DPST
120 vac Case Ground
Water Pump
BK-18
GN-18
WH-18
BK-18
GN-18
12 vdc Power Supply
BK-18(-)
BK-18(+)
GND
Circuit Breaker
ECO
WH-18
(+)
T-MID
YL-24
YL-24
YL-18
T-IN
RD-24
RD-24
RD-18
RD-18
GND
GN-18
RD-18
TP3 (24V)
TP4 (GND)
NOT USED
TP6 (GND)
System Control Board
TP5 (24V)
NOT USED
DSI Board
WH-18
BK-18
RD-18
Modulating Valve
BK-18
BK-18
RD-18
BL-18
GN-18
Igniter Probe
GN-18
Regulator Valve
GN-18
GND
BL-18
BL-18
GND
56 SCHEMATIC
PROPRIETARY INFORMATION
REVISIONS
A 01/20/00 GG
B 02/16/00 GG
C 08/29/01 MR
D 12/07/01 MR
E 06/03/04 SCA
Precision Temp
DRAWN BY: G.H.GAUSMAN
SCALE: 1:1
APP: C
DATE: 1/14/00
SHEET: 1 of 1
SCHEMATIC (56)
SCHEM 56

PT-200 FT Service Codes

The following service codes are shown by the red flashing LED located on the front of the electronics drawer behind the front access door. These codes indicate the type of malfunction. Consult the corresponding service bulletin in the service manual or call PrecisionTemp at 1-800-934-9690 for corrective action. Prior to calling, ensure that you have the booster heater serial number and software version on hand.

For all codes except the single red flash, heater will continue to operate, but the problem should be addressed to ensure optimum performance and temperature control. Codes will flash each second followed by a three second pause. A green flashing LED without any red flashing LED indicates normal operation. If the green LED flashes while the red LED flashes, ignore the green LED and only count the red flashes. NOTE: You may want to physically cover the green LED with your finger, so as not to confuse the flashes.

Note: Service codes will continue to flash after the problem has been corrected. To ensure that problem has been corrected, the power switch on the booster should be turned off, wait 10 seconds, and then turned back on.

Single red flash- * pause * pause * pause

Indicates T-mid thermistor (yellow wire) has failed or is unplugged. Booster heater will not operate correctly until problem is corrected. Consult SB-15 or SB-17 to correct.

Two red flashes- ** pause ** pause ** pause

Indicates T-out thermistor (red wire) has failed or is unplugged. Booster heater will not operate correctly until problem is corrected. Consult SB-16 or SB-17 to correct.

Three red flashes- * pause *** pause *** pause**

Indicates T-in thermistor (blue wire) has failed or is unplugged. Booster heater will not operate correctly until problem is corrected. Consult SB-16 or SB-17 to correct.

Four red flashes- ** pause **** pause **** pause**

Indicates T-out is not in normal operating range, but the booster heater will continue to operate; user may notice temperature shift. Consult SB-16 or SB-17 to correct.

Five red flashes- *** pause ***** pause ***** pause**

Indicates T-in is not in normal operating range, but the booster heater will continue to operate; user may notice temperature shift. Consult SB-16 or SB-17 to correct.

Six red flashes- **** pause ****** pause ****** pause**

Indicates the booster hot water outlet and cold water inlet lines are connected in reverse. Temperature will be too low or will fluctuate radically. Reverse connections to correct.

Seven red flashes- ***** pause ******* pause ******* pause**

The direct spark ignition board (DSI) has locked out. The DSI will automatically reset within 45 seconds, but LED will continue to flash. Booster heater can be manually reset immediately by turning power switch off, wait 10 seconds, and turn back on.

PT-200RC & PT-56 (Recirculating) Service Codes

The following service codes are shown by the red and green flashing LED located on the front of the electronics drawer behind the front access door. These codes indicate the type of malfunction.

Alternating green and red flash

Lost auto calibration or no auto calibration displays. See **SB-7-RC**

Steady red and flashing green LED

T-mid or T-out Thermistor failure. See **SB-15 and SB-17.**

Red and green LEDs flashing together

Lock out after 10 ignition attempts. Turn booster power switch off, wait 15 seconds and turn back on.

SB-1 12 Volt Power Supply Change Procedure

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools Required: Phillips screwdriver

Process:

1. Turn booster heater power switch off, unplug the unit from the 110v AC wall outlet and remove front cover.

2. Ensure that the power supply you are replacing is for 12 Volts and not 24 Volts. If you attempt to install the incorrect power supply, it will damage the unit and void any warranty.

3. Remove the 4 screws holding the power supply bracket and remove the power supply.

4. On the new power supply find the wire that has the white printing (+). Attach this lead to the circuit breaker located in the control drawer. The plain black lead (-) connects to the ground terminal.

5. Place the power supply in the bracket and re-attach.

6. Plug 110v AC into outlet and turn booster heater power.

7. Verify that the green LED is flashing; ensure proper operation by running several racks through the dish machine.

Kit Parts List:

AS 1897 12v DC Power supply assembly

Reference Illustrations:

None

SB-1A 24 Volt Power Supply Change Procedure

Model: PT-200FT & PT-200RC

Software version: All

Tools Required: Phillips screwdriver

Process:

1. Turn booster heater power switch off and unplug the unit from the 110 VAC wall outlet.

2. Remove the front cover. Remove the 4 screws holding the power supply bracket and remove the power supply.

3. On the new power supply find the wire that has the Female socket (+). Attach this lead to the "Molex" connector supplying the white power wire to the gas modulating valve. The plain black lead (-) with the Ring connector, connects to the ground screw located below the control drawer on the burner saddle.

4. Place the power supply in the bracket and re-attach it.

5. Plug the 110v AC power cable tightly into the back of the 24 volt power supply, and plug the power cable back into the wall outlet.

6. Lock the dish machine into a rinse mode and turn power ON, verify that the PT-200 ignites and the modulating gas valve ramps up to high fire.

Kit Parts List:

AS 1613 24v DC Power supply assembly

Reference Illustrations:

None

SB-2 Pressure Switch Adjustment

Model: PT-200FT and PT-200RC

Software version: All

Tools Required: Flat blade screw driver or 5/64 Allen wrench

Process:

1. Lock the dish machine into a rinse mode.

2. Turn the booster heater power switch on.

3. With the dish machine rinse running and the booster heater blower running, turn the adjustment screw on the pressure switch (type may vary) counter-clockwise until the burner ignites.

4. Disconnect the exhaust flue at the first joint outside the booster heater case. Block flue exiting the booster heater and verify burner extinguishes. If it does not, turn screw clockwise until it does extinguish.

5. Unblock flue and verify burner ignites. If booster ignites, reconnect the exhaust flue.

6. After adjusting the pressure switch, replace front cover and run several racks through the dish machine to verify proper adjustment of the pressure switch.

Parts Kit:

None

Reference Illustrations:
200-6 & 200-2937

SB-3 Circuit Board Replacement

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools Required: Needle-nose pliers
SB-7 Auto-calibration service bulletin (match software version)

Process:

1. Turn booster heater power switch off.

2. Disconnect all electrical connectors at the circuit board.

3. Remove the circuit board. Needle-nose pliers can be used to remove the circuit board nylon standoffs.

4. Install the new board with the LED's located at the front of the drawer and aligned with LED sockets on drawer.

5. Reconnect all connectors to the board. CAUTION: there are three two-pin connectors. Be sure that the power supply connector (red and green wire) goes to upper right corner (red connector) and the modulating valve connector (black wire) goes to lower right (blue connector) (see Fig. 200-14). The third two-pin connector is not used.

6. The booster heater outlet temperature has been preset to 4.20 VDC (192°F). Refer to manual if a further adjustment is needed. See SB-10.

7. Perform auto-calibration per SB-7. Be sure to refer to present software version for auto-calibration bulletin.

Kit Parts List:

EL 90XX Micro-controller chip-already installed in board
(9098 series is for PT-200RC & PT-56, 9097& 9099 series is for PT-200)
EL 1325 Standoffs (already installed in board)
AS 1841- Circuit board

Reference Illustrations:
200-14

SB-3 Circuit Board Replacement Software Reference

Model: PT-200FT, PT-200RC, PT-56

Software versions:

9097 software is for the standard Flow Through model, current version available 9097J or T (4-5 gpm rinse cycle)

9099 software is for the OR Flow Through model, current version available 9099D or T (2-3 gpm rinse cycle)

9098 software is for the Recirculation model, current version available 9098O (recirculation)

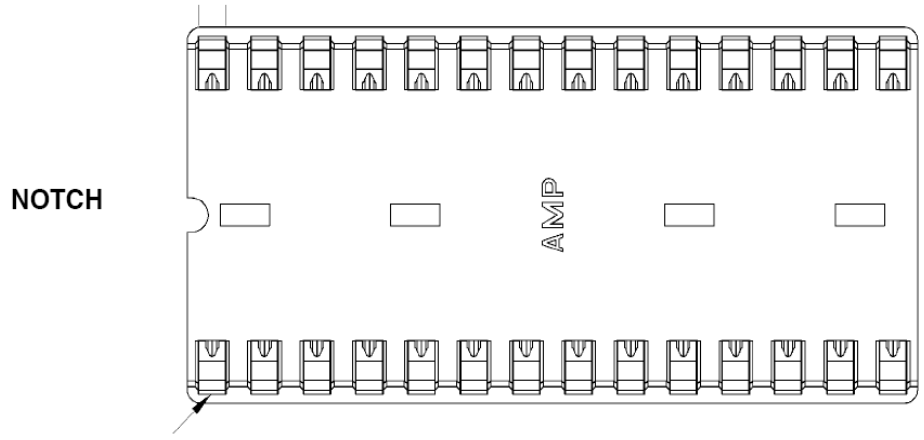
Micro-processor replacement procedure

This procedure should be followed when placing the software micro-processor on the *PrecisionTemp* control board. Before proceeding be sure the software is the proper version for your application. Before taking the micro-processor out of the package ground yourself by touching the metal chassis of the heater or any other grounded metal object to ground you from static electricity.

- Remove the old micro-processor with a chip puller or gently pry it from the end of the socket using a small blade screw driver.
- Take the new micro from the package and locate the half-moon notch on the end of the top of the micro.
- This notch must align with the notch on the socket, (See Illustration). This notch is always toward the LEDs on the board.
- Tilt the micro to insert one row on pins into the socket.
- Once this row is inserted, rock the micro to insert the other row of pins.

IMPORTANT: Care must be taken to insure proper alignment so that the pins aren't crushed or do not insert in the socket. If the pins are spread too widely to properly insert, remove the micro and place the it on its side on a flat surface to bend the pins in toward the center. Re-insert into board.

- Push micro tightly into socket and inspect to be sure all pins are in the sockets and not bent. Correct if necessary.



Micro Socket on Control Board

SB-5 Igniter Change Procedure & Spark Gap Adjustment

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools Required: Phillips screwdriver
Needle Nose Pliers (to adjust probes)

Process:

1. Turn power to booster heater OFF and close the gas supply valve to the booster heater.

2. Remove the front door and locate the igniter (see figure 200-10).

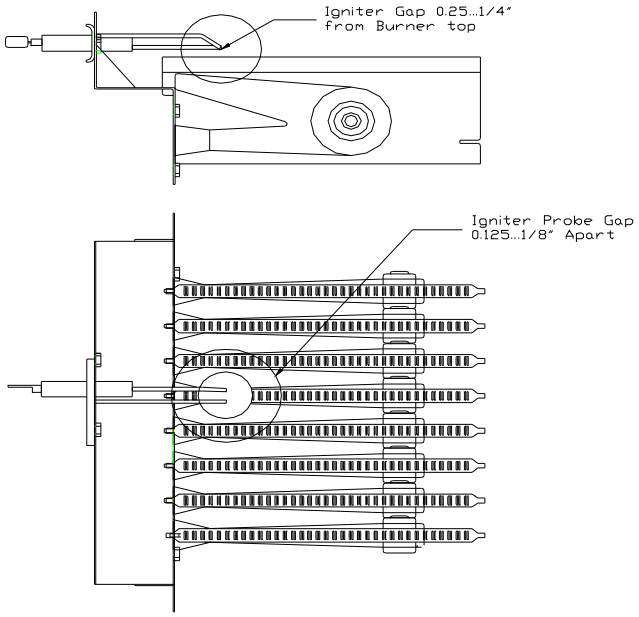
3. Disconnect the ignition wire from the igniter.

4. Using a Phillips screwdriver remove the two screws attaching the igniter to burner and remove.

5. Install the new igniter and check that the igniter probes are 0.125 - 0.250" above the center burner blade as shown in figure below. Gap between two probes should be about 0.125".

6. Turn gas ON and check for leaks with AGA approved leak detector solution (if the burner was removed).

7. Turn power ON and verify that the unit ignites properly and that spark is affected for maximum of 5 seconds.



Parts Kit:

Reference Illustrations:

200-10 Spark Ignition and Probe

SB-6 Direct Spark Ignition (DSI) Board Change

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools Required: screw driver

Process:

1. Turn booster power switch off and remove front cover.

2. Open the electrical drawer and pull all the way out from its saddle.

3. Remove the DSI board.

4. Install the new DSI board and re-attach the wire harnesses. Be sure to route the yellow or black ignition wire separate from the other control harnesses. (If a new harness is supplied, use it and discard the old harness.)

5. Replace front cover and turn booster power switch on.

6. Ensure proper operation of the booster heater by running several racks through the dish machine and ensuring that proper rinse water temperature is reached.

Kit Parts List:

P/N 3158 Direct Spark Ignition (DSI) board
(#3166 bracket if required)

Reference Illustrations:
200-3158 & 200-3166

SB-7-FT Automatic Calibration (AutoCal) Procedure

Model: PT- 200FT

Software version: 9097-I,J & T and 9099-C, D & T

Tools Required: Needle-nose pliers

CAUTION: During this test the unit will be performing several self tests. Do not attempt to use dish machine. The booster heater will increase the gas flow from minimum to maximum over 8 minutes. Be sure to monitor the unit for safe operation.

Process:

1. Turn power off and remove front cover. Open electronic drawer. Ensure that the software version on the microprocessor is one that is listed above. From the front circuit board, remove the 2-pin jumper cap from **ACAL** (back jumper) using pliers or fingers (see figure 200-14).

2. Lock the dish machine in rinse mode. **(Rinse MUST stay on for the entire procedure).**

3. Turn heater power on. Green LED should flash and burner comes on to high burn and immediately drops back to low burn. If red light flashes there is a problem that must be corrected first, and then restart this entire procedure. See PT-200FT service codes for what each code means.

4. Over the next 8 minutes the unit will increase the gas flow to calibrate the valve. The unit will run the test by itself and only requires monitoring for safety. When the test is ended the red LED will flash rapidly and the burner will shut off.

5. Replace the 2-pin jumper cap on the board.

6. Turn power OFF, wait 20 seconds and turn power back on.

7. Check the unit for normal operation. If operation appears normal the procedure is complete. If the unit does not operate correctly or gas flow varies excessively repeat the procedure.

Kit Parts List:

None

Reference Illustrations:

Figure 200-14 Control Board

SB-7 Automatic Calibration (AutoCal) Procedure

Model: PT- 200FT

Software version: 9097-A, 9097-B, 9097-C, 9097-D, 9097-E, 9097-F, 9097-G and 9099-A

Tools Required:

Needle-nose pliers

Process:

CAUTION: During this procedure, the unit will be performing several self tests. Do not attempt to use the dish machine during this period. The booster heater will increase the gas flow from minimum to maximum over about 8 minutes. Be sure to monitor the unit for safe operation.

1. Turn booster heater power switch off and remove front cover. Open electronic drawer. Ensure that the software version on the microprocessor is one that is listed above.

2. From the front circuit board, remove the 2-pin jumper cap from **ACAL** (back jumper) using pliers or fingers (see figure 200-14).

3. Lock the dish machine in rinse mode. (Rinse MUST stay on for the duration of this process).

4. Place a magnet on the modulating gas line just right of the electrical coil and move it slowly towards the gas solenoid.

5. Turn booster heater power switch on. Green LED should flash and burner ignite to high burn. If red light flashes there is a problem that must be corrected before continuing. See service code guide.

6. Remove the magnet SLOWLY from the gas line. Burner should return to low burn.

7. Over the next 8 minutes the unit will increase the gas flow to calibrate the valve. When the test is complete, the burner will shut down and the red LED will flash rapidly.

8. Turn power switch off and wait 20 seconds.

9. Replace the 2-pin jumper cap on the circuit board and turn power switch back on.

10. Check the unit for normal operation. If operation appears normal the procedure is complete. If the unit does not operate normally or gas flow varies excessively repeat the procedure.

Kit Parts List:

None

Reference Illustrations:

Figure 200-14 View of Control Board

SB-7-RC Auto-Calibration Procedure

Model: PT-200RC & PT-56

Software version: 9098-K, 9099-L, 9098-M, 9098-N & 9098-O

Tools Required: Needle Nose Pliers

Process:

1. Turn booster heater power switch off and remove front cover. Open the electronic drawer. Ensure that the software version on the microprocessor is one that is listed above.

2. From the control circuit board remove the 2-pin (rear) jumper cap from terminal marked **Acal** using pliers or fingers (see figure 200-14). Be sure water in recirculating system is cooler than set temperature on booster (under 140°F). If unable to verify, keep booster heater power off and run the dishmachine rinse.

3. Turn booster heater power switch on. The unit will ignite and then stay in high burn. Over the next 1 minute the gas flow will change slightly as the computer determines the proper voltage for minimum flow. After the computer completes auto-calibration the burner will automatically shut off.

4. Turn power to heater off for a minimum of 20 seconds.

5. Replace the jumper on the circuit board.

6. Turn power to heater back on. To check the unit for normal operation, run several racks through the dish machine and ensure proper rinse temperature is reached.

Kit Parts List:

None

Reference Illustrations:

200-14 Electronic Control board

SB-7-RC-B Auto-Calibration Procedure

Model: PT-200RC

Software version: 9098-A, 9098-B, 9098-C, 9098-D, 9098-E, 9098-F, 9098-G, 9098-H, 9098-I, and 9098-J.

Tools Required: **Needle Nose Pliers**

Process:

1. Turn power switch on heater off and remove front cover. Open the electronic drawer. Ensure that the software version on the microprocessor is one that is listed above.

2. From the control circuit board, remove the 2-pin (rear) jumper from terminal marked **Acal** using pliers or fingers (see figure 200-14). Be sure water in recirculating system is cooler than set temperature on booster (under 140°F). If unable to verify, keep booster heater power off and run the dishmachine rinse.

3. Place magnet on modulating valve just to the right of the coil and move it about 3/4" to the right.

4. Turn power switch on booster on. The burner will ignite in high burn.

5. Slowly remove magnet from modulating valve.

6. Over the next minute the gas flow will change slightly as the computer determines the proper voltage for minimum flow. After the computer completes auto-calibration the burner will automatically shut off.

7. Turn off power.

8. Wait at least 20 seconds, and replace jumper on the circuit board.

9. Turn power on and check the unit for normal operation.

Parts Kit List:

None

Reference Illustrations:

200-14 Electronic Control board

SB-8 Modulating Valve Replacement

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools Required: Pipe wrench
12" Adjustable wrench

Process:

1. Turn off power switch on booster and shut gas off at valve outside booster case.

2. Unplug the modulating valve 2-pin connector. It is the 2 pin black and white wire connection just in front of the gas train assembly.

3. Place adjustable wrench on the union (located in front of the burner manifold) in front of the modulating valve and loosen to remove. Unscrew modulating valve from the gas solenoid using pipe wrench.

4. **IMPORTANT! USE AGA-APPROVED SEALANT ON ALL GAS THREAD CONNECTIONS BEING VERY CAREFUL NOT TO ALLOW ANY TO PENETRATE THE MODULATING VALVE CAVITY. IF THIS IS NOT STRICTLY FOLLOWED IT WILL CAUSE THE MODULATING VALVE TO BECOME STICKY AND MALFUNCTION AND HEATER WILL NOT CORRECTLY OPERATE.**

5. Re-assemble the heater reversing the procedure. **Ensure that the gas is flowing in the direction of the arrow on the collar of the valve.**

6. Reconnect wire connector and retighten union.

7. Turn on gas supply. Check for gas leaks.

8. Power up unit.

9. An Auto Calibration (see SB-7) procedure must be completed. Be sure to use the Auto Calibration procedure specific to your type of unit (Recirculating or Flow Through) and software version. Strictly follow the instructions. Failure of this process will cause system malfunction.

10. After completing Auto Calibration procedure, lock the dish machine into rinse mode and check for normal operation.

Kit Parts List:

Modulating Valve assembly

Reference Illustrations:

200-12

SB-10 Changing Outlet Temperature Setting

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools Required: Small flat blade screw driver
Digital Multi meter/Voltmeter

Process:

NOTE: The temperature on the booster heater has been factory set to approximately 192°F. It is not recommended that you change this setting. Doing so could result in water temperature too low to sanitize dishware or high enough to bake food matter onto dishes, or cause booster heater to overheat water and shut down. If it is necessary to change the setting it can be done as follows:

1. Open access door of heater. Open the electronic drawer. The adjustment screw is located on a small blue block at the lower right corner of the electronics board (see reference illustration #200-14).

2. Use a voltmeter and insert the black lead in black test point and the red lead in blue test point (see reference illustration #200-14). A reading of 4.20 VDC from the voltmeter will set the temperature control at 192°F. A small blade screwdriver should be used to adjust the temperature screw. To decrease temperature, turn screw counterclockwise. To increase temperature, turn screw clockwise. Each full turn will change the water temperature approximately 7°F.

3. Check the water temperature on digital display of booster heater or at temperature gauge on dish machine and adjust as necessary.

Kit Parts List:

None

Reference Illustrations:

200-14 Electronic Control Board

SB-11 Fan Relay Test Procedure

Model: PT-200FT and PT-200RC

Software version: All

Tools Required: DC Multimeter
Needle-nose pliers

Process:

1. Turn heater power switch off and remove front cover. Locate the fan relay.

2. Set your multimeter to volts DC. Using the illustration below, connect your meter to the 12v DC side of the relay.

3. Turn the power on to the booster heater and verify you have 12v DC on the relay (the relay will only be energized for 8 seconds after power is turned on).

4. If power is present, continue to next step. If not, please refer back to the troubleshooting guide.

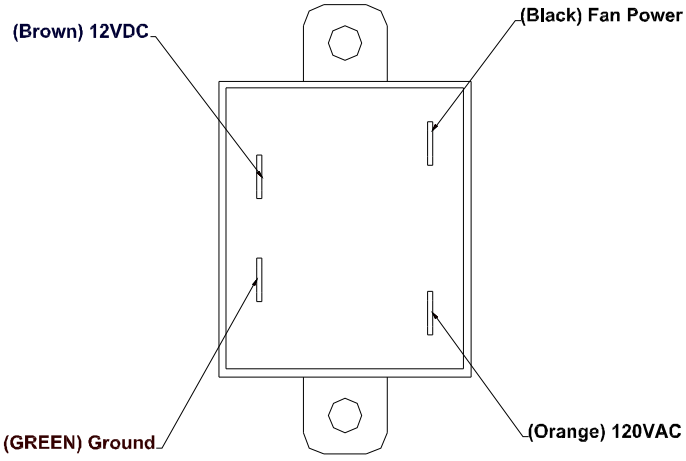
5. Switch your multimeter to 120v AC. Turn the booster heater off.

6. Using the illustration below, connect your meter to the 120v AC side of the relay.

7. Turn booster heater power switch on and verify you have 120v AC on the relay.

8. If 120v AC is present, turn to booster heater off and connect the orange and black wire.

9. Turn the power on to the booster heater. If the fan comes on, replace the relay. If the fan does not come on, replace the blower fan.



Kit Part List:
None

Reference Illustrations:
200-14 Electronic Control Board

SB-12 Combination Gas Valve Replacement

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools required: Pipe wrench
12" adjustable wrench
Pipe sealant

Process:

1. Disconnect the power to the booster heater.
2. Disconnect the blue & white wires connected to the combination gas valve.
3. Turn off the gas supply to the booster heater.
4. Separate the closest gas union outside of the booster heater.
5. Remove all gas line plumbing between the gas valve and half union.
6. Separate the union to the left of the modulating gas valve.
7. Remove the combination gas valve and modulating gas valve from the remaining gas train.
8. Install new combination gas valve in reverse order using approved pipe sealant, ensuring that sealant does not get into the modulating gas valve.
9. Pressurize the gas line.

Be sure to check all gas fittings with an approved leak test solution before restarting the PT-200.

Note:
It may take several ignition attempts to purge all the air from the refitted gas line.

Kit Parts List:
PT-200 & PT-56 Solenoid Valve

Reference Illustrations:
200-9 Combination Gas Valve

SB-13 Flow Meter Check and Replacement

Model: PT-200FT

Software version: All

Tools required: 2 adjustable wrenches or slip joint pliers
Phillips screw driver

Process:

Check Operation

1. Lock the dish machine into the rinse mode.

2. Turn the power to the PT-200 on.

3. Check for a plumbing bypass (if there is, make sure it is closed to assure flow of rinse water through the booster.)

4. Watch the flashing green LED on the green control board. Once you see a pause, start counting the green flashes until the next pause. Verify the count twice.

5. Divide the number of flashes between pauses by 3. This resulting number will be the flow rate in gallons per minute. Example - 15 flashes between pauses divided by 3 = 5 GPM.

6. If you do not see a pause in the green LED with the rinse running, the flow meter is not sensing flow or no water is passing through booster or you have a recirculating booster heater (See PT-200RC troubleshooting diagram).

Adjustment or Replacement

1. Be sure the pick-up wire on top of flow meter (2354) is tight.

2. Check flow meter connector to control board.

3. Replace flow meter by the following procedure:
   a. Turn off water at shut off valve outside of booster.
   b. Remove 4 Phillips screws from side access panel (digital display) & let panel hang from side. Take care not to damage digital display wiring.
   c. Ensure that the water in the pipe is cool. Using 2 wrenches or slip joint pliers loosen the union nuts on either side of the flow meter and remove the flow meter and gaskets (2354 Flowmeter only).
   d. Verifying flow direction, install new meter with 2 new gaskets (2354 Flowmeter only) and tighten union nuts (do not over tighten 3226 Flowmeter union nuts).
   e. Replace access panel.
   f. Test

Parts Kit List:

2354 or 3226 Flowmeter

Illustrations:
200-3226 & 200-4

SB-14 Burner Manifold Pressure Check and Adjustment

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools required: DC Multi-meter
Manometer

Process:

1. Disconnect the power to the PT-200/56 and turn the gas supply off at the manual valve outside of the booster heater.
2. Remove the 1/8" brass plug on the left side of the burner manifold.
3. Once you have removed the 1/8" plug, connect the manometer.
4. Locate the two pin connector coming from the gas modulating valve (Illustration 200-12).
5. Switch multi-meter to 20v DC scale.
6. Slide the probes behind the two wires of the 2-pin connector coming from the gas modulating valve. Red probe to the white wire and black probe to black wire.
7. Turn on the gas supply at the manual valve and turn power to booster heater back on.
8. With your manometer and multi-meter connected, lock the dish machine into a rinse mode, reconnect electrical power to the booster heater and turn the PT-200/56 on.
9. At ignition there should be 0v DC going to the gas modulating valve coil, the manometer should read approximately 0.25 - 0.50 WCI.
10. If all conditions are correct, once the flame is detected you should have approximately 22v DC (12vDC PT-56) and 2.85 WCI - 3.70WCI @ full burn **depending on model year & type gas**, refer to product label on access door.
11. Remove manometer and replace 1/8" plug using approved pipe dope.

Adjusting Manifold Pressure

1. Remove cap from combination gas valve regulator. (ILL. 200-9)
2. Turn screw under cap clockwise to increase manifold pressure and counter-clockwise to reduce pressure to the correct reading.
3. Replace cap on the combination gas valve.

Be sure to check all gas fittings with approved leak test solution before restarting the PT-200/56.

Kit Parts List:

None

Reference Illustrations:

200-12 Gas Modulation Valve
200-9 Combination Gas Valve

SB-15 T-Mid Thermistor Change Procedure

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools required: 9/16" Open end wrench
Adjustable wrench

Process:

1. Turn power off and turn off water supply at shut off valve outside of the booster heater.

2. Remove old thermistor and disconnect from harness. **CAUTION:** Use two wrenches, one on the hex (9/16") of the thermistor and an adjustable wrench on the hex located on the heat exchanger fitting. Failure to do so may damage the heat exchanger.

3. Insert the end of the thermistor without electrical leads into the heat exchanger until the heat shrink (black) on the thermistor touches the fitting and tighten the fitting finger-tight. The final tightening should be done using two wrenches as described in step 1.

4. Connect the thermistor to the wiring harness.

5. After installing the mid thermistor lock the dish machine into rinse mode and check for normal operation. If the booster outgoing temperature fluctuates more than 5 degrees from the set temperature perform the Auto Calibration procedure.

6. If the Auto Calibration (see SB-7) procedure is needed be sure to use the AutoCal specific to your type of unit (Recirculating or Flow Through), check for correct software version.

Parts Kit List:

1854 T-Mid Thermistor
CPI Fitting

Reference Illustrations:

200-13 Thermistor Harness

SB-16 T-Out/ T-In Thermistor Change Procedure

Model: PT-200FT, PT-200RC & PT-56

Software version: All

Tools Required: Scissors (or other cutting tool)

Process:

1. Disconnect power to the booster.

2. Remove the wire ties, metal tape, and old thermistor. Clean off the old heat sink and be sure copper is wiped clean.

3. Place a pea size amount of heat sink compound on the pipe where the thermistor will be located.

4. Place the thermistor into the heat sink with the wire leads pointing down along the tube.

5. Wrap metal tape around the tube and thermistor.

6. Attach the wire tie. Wrap the wire tie about 1/2" away from the thermistor head to hold the thermistor against the tube. **CAUTION:** 1) Do not place the tie wrap over the thermistor tip as this may damage the thermistor, do not over-tighten the wire tie.

7. Connect the thermistor to the wiring harness.

8. Replace front cover of booster heater and turn power switch back on.

9. Perform test of the unit by running several racks through the dish machine to ensure that proper rinse temperature is reached.

Kit Parts List:

1436 T-in Thermistor Assembly Kit
1437 T-out Thermistor Assembly Kit

Reference Illustrations:

200-13 Thermistor Harness

SB-17 Thermistor Reading Procedure

Model: PT-200FT, PT200RC & PT-56

Software version: All

Tools required: DC Multi meter

The precise temperature of the water in the heater can be determined by reading thermistor DC voltages at the colored test points on the green control board (See Electronic Control Board—Illustration #200-14) with a multi-meter and referring to the "Thermistor Calibration" table.

The **black multi-meter probe** should go into the **black test point** and the red probe should go into the following test points:

Orange/Red Test Point = Outlet temperature (T-Out)
Yellow Test Point = Mid temperature (T-Mid)

Inlet temperature (T-In) is read from inboard blue wire on connector #1329 (thermistor harness plug) of the green control board.

Power must be on for the booster to take the readings. Refer to the DC voltage reading in the "volts" column on the "Thermistor Calibration" chart. The corresponding temperature is the column to the left of the volt reading.

Kit Parts List:
None

Reference Illustrations:
200-14 Electronic Control Board

PrecisionTemp™

Thermister Calibration

Check @ colored test point

Yellow = T-Mid **Black = Common**

Orange = T-out **Inboard Blue wire = T-in**

K-OHMS	°F	Volts	K-OHMS	°F	Volts	K-OHMS	°F	Volts	K-OHMS	°F	Volts
2.500	*41.19*	4.1514	0.273	*135.06*	1.7411	0.179	*156.54*	1.2971	0.107	*184.70*	0.8657
2.400	*42.68*	4.1223	0.271	*135.42*	1.7327	0.177	*157.13*	1.2863	0.106	*185.24*	0.8590
2.300	*44.25*	4.0911	0.269	*135.79*	1.7244	0.175	*157.73*	1.2755	0.105	*185.78*	0.8523
2.200	*45.89*	4.0575	0.267	*136.16*	1.7159	0.173	*158.34*	1.2646	0.104	*186.33*	0.8455
2.100	*47.62*	4.0214	0.265	*136.53*	1.7075	0.171	*158.95*	1.2537	0.103	*186.88*	0.8388
2.000	*49.45*	3.9825	0.263	*136.91*	1.6990	0.169	*159.58*	1.2426	0.102	*187.44*	0.8320
1.900	*51.38*	3.9403	0.261	*137.28*	1.6904	0.167	*160.21*	1.2316	0.101	*188.01*	0.8252
1.800	*53.43*	3.8944	0.259	*137.67*	1.6818	0.165	*160.85*	1.2204	0.100	*188.58*	0.8183
1.700	*55.62*	3.8444	0.257	*138.05*	1.6732	0.163	*161.50*	1.2092	0.099	*189.16*	0.8115
1.600	*57.95*	3.7897	0.255	*138.44*	1.6645	0.161	*162.16*	1.1979	0.098	*189.75*	0.8046
1.500	*60.45*	3.7295	0.253	*138.83*	1.6558	0.159	*162.82*	1.1866	0.097	*190.34*	0.7977
1.400	*63.15*	3.6630	0.251	*139.23*	1.6470	0.157	*163.50*	1.1751	0.096	*190.95*	0.7908
1.300	*66.08*	3.5892	0.249	*139.63*	1.6382	0.155	*164.19*	1.1637	0.095	*191.55*	0.7838
1.200	*69.27*	3.5067	0.247	*140.03*	1.6293	0.153	*164.89*	1.1521	0.094	*192.17*	0.7769
1.100	*72.78*	3.4140	0.245	*140.44*	1.6204	0.151	*165.60*	1.1405	0.093	*192.79*	0.7699
1.000	*76.67*	3.3091	0.243	*140.85*	1.6114	0.149	*166.32*	1.1288	0.092	*193.42*	0.7629
0.900	*81.03*	3.1892	0.241	*141.26*	1.6024	0.147	*167.05*	1.1170	0.091	*194.06*	0.7558
0.800	*85.97*	3.0511	0.239	*141.68*	1.5933	0.145	*167.79*	1.1052	0.090	*194.71*	0.7488
0.700	*91.67*	2.8902	0.237	*142.11*	1.5842	0.143	*168.55*	1.0933	0.089	*195.37*	0.7417
0.600	*98.39*	2.7003	0.235	*142.53*	1.5751	0.141	*169.32*	1.0813	0.088	*196.03*	0.7346
0.580	*99.88*	2.6581	0.233	*142.96*	1.5659	0.139	*170.10*	1.0692	0.087	*196.71*	0.7274
0.560	*101.44*	2.6144	0.231	*143.40*	1.5566	0.137	*170.89*	1.0571	0.086	*197.39*	0.7203
0.540	*103.06*	2.5690	0.229	*143.84*	1.5473	0.135	*171.70*	1.0449	0.085	*198.08*	0.7131
0.520	*104.75*	2.5218	0.227	*144.28*	1.5379	0.133	*172.52*	1.0326	0.084	*198.78*	0.7059
0.500	*106.52*	2.4728	0.225	*144.73*	1.5285	0.131	*173.35*	1.0202	0.083	*199.49*	0.6987
0.480	*108.36*	2.4218	0.223	*145.18*	1.5191	0.129	*174.20*	1.0078	0.082	*200.21*	0.6914
0.460	*110.30*	2.3687	0.221	*145.64*	1.5096	0.128	*174.63*	1.0016	0.081	*200.95*	0.6841
0.440	*112.34*	2.3134	0.219	*146.11*	1.5000	0.127	*175.07*	0.9953	0.080	*201.69*	0.6768
0.420	*114.49*	2.2556	0.217	*146.57*	1.4904	0.126	*175.51*	0.9890	0.079	*202.44*	0.6695
0.400	*116.75*	2.1954	0.215	*147.05*	1.4807	0.125	*175.95*	0.9827	0.078	*203.21*	0.6621
0.380	*119.15*	2.1324	0.213	*147.52*	1.4710	0.124	*176.40*	0.9764	0.077	*203.98*	0.6548
0.360	*121.70*	2.0666	0.211	*148.01*	1.4612	0.123	*176.85*	0.9700	0.076	*204.77*	0.6474
0.350	*123.04*	2.0325	0.209	*148.50*	1.4514	0.122	*177.30*	0.9637	0.075	*205.57*	0.6399
0.340	*124.42*	1.9976	0.207	*148.99*	1.4415	0.121	*177.76*	0.9573	0.074	*206.38*	0.6325
0.335	*125.13*	1.9799	0.205	*149.49*	1.4316	0.120	*178.23*	0.9509	0.073	*207.21*	0.6250
0.330	*125.85*	1.9620	0.203	*149.99*	1.4216	0.119	*178.70*	0.9444	0.072	*208.05*	0.6175
0.325	*126.58*	1.9438	0.201	*150.50*	1.4115	0.118	*179.17*	0.9380	0.071	*208.90*	0.6100
0.320	*127.32*	1.9254	0.199	*151.02*	1.4014	0.117	*179.65*	0.9315	0.070	*209.77*	0.6024
0.315	*128.08*	1.9068	0.197	*151.54*	1.3912	0.116	*180.13*	0.9250	0.069	*210.65*	0.5948
0.310	*128.86*	1.8879	0.195	*152.07*	1.3810	0.115	*180.62*	0.9185	0.068	*211.54*	0.5872
0.305	*129.64*	1.8689	0.193	*152.61*	1.3707	0.114	*181.11*	0.9120	0.067	*212.46*	0.5796
0.300	*130.45*	1.8496	0.191	*153.15*	1.3604	0.113	*181.61*	0.9054	0.066	*213.38*	0.5719
0.295	*131.26*	1.8300	0.189	*153.70*	1.3500	0.112	*182.11*	0.8989	0.065	*214.33*	0.5642
0.290	*132.10*	1.8102	0.187	*154.25*	1.3395	0.111	*182.62*	0.8923	0.064	*215.29*	0.5565
0.285	*132.95*	1.7902	0.185	*154.81*	1.3290	0.110	*183.13*	0.8857	0.063	*216.27*	0.5488
0.280	*133.82*	1.7699	0.183	*155.38*	1.3184	0.109	*183.65*	0.8790	0.062	*217.27*	0.5410
0.275	*134.70*	1.7494	0.181	*155.96*	1.3078	0.108	*184.17*	0.8724	0.061	*218.29*	0.5332

SB-18 PT-56 Tank Assembly Change Procedure

Model: PT-56

Other Service documents required:
SM56-13 Testing the PT56
Tools Required:
Small adjustable wrench
Large adjustable wrench
Phillips screwdriver
13/16 open end wrench
11/16" open end wrench
¾" open end wrench
2 pipe wrenches
11/32" socket
Needle nose pliers

8. **Turn off the water supply to the booster water inlet.**
9. **Now drain the water from the booster heater. Before proceeding provide a method of draining about 3.5 gallons of water. Loosen a connection at the booster inlet. Very little water will drain until the next step. Loosen the two compression fittings PF 1547 (see figure TS56-2) and the booster will drain from the loose fitting at the booster inlet.**
10. **Remove the T&P valve, including the extension fitting.**
11. **Disconnect the inlet and outlet water lines. Remove the inlet and outlet pipes from the bottom of the unit leading to the tank.**
12. **Remove the one screw holding the power supply bracket BK 1457 to the left side of shroud AS 1462 using the phillips screwdriver. Remove the ten (10) screws attaching the case shroud AS 1462 to the base CS 1455. Remove the shroud.**
13. **Open the two compression fittings PF 1547 from the step above.**
14. **Using an 11/32" socket remove the three nuts FS 1492 holding the tank to the base and lift the tank and pump assembly from the base. The pump electrical cord will still be connected to the power supply bracket.**
15. **Open the pump electrical cover by removing the one cover screw. Inside remove the two wire nut screws and separate the wires. Unscrew and remove the green ground wire. Use needle nose pliers to remove the strain relief for the harness.**
16. **Put a pipe wrench on the hex at the tank fitting going to the pump and unscrew the tank from the pump and piping. If the ¾" close nipple remains in the tank use the supplied part in the new tank.**
17. **Install the new tank assembly AS 1679 reversing steps 9, 8, 7, 6, 5, 4, and 3 and tighten the fittings at the booster inlet and outlet. Remember to clean all NPT fittings and apply teflon tape to all water threaded fittings.**
18. **Turn water ON and open the booster outlet to fill the booster and remove air. Also, check for water leaks. If necessary, prime the pump (see SM56-12).**
19. **Perform a test of the unit using steps 3, 5, and 6 of SM56-13 'Testing the PT56'.**

SB-19 PT-56 Pump Change Procedure

Model: PT-56

Tools Required:

Needle nose pliers
5/8" hex wrench & 5/8"swivel socket
Screw driver

20. Turn off the power and water supply to the booster water inlet.
21. Before proceeding provide a method of draining about 3.5 gallons of water from the tank. Now drain the water from the booster heater. Loosening a connection at the booster water inlet will aid in draining.
22. Open the pump electrical cover by removing the one cover screw. Inside remove the two wire nut screws and separate the wires. Unscrew and remove the green ground wire.
23. Remove the pump's electrical strain relief using needle nose pliers.
24. Remove upper screw on the Power supply bracket and bend forward to help access pump flange bolts.
25. Using a 5/8" wrench remove the four bolts from the two pump flanges. Remove the pump.
26. Install the new pump using the new flange o-ring seals provided with the replacement pump and reinstall the four bolts.
27. Open the new pump electrical cover by removing the one cover screw. Use the wire nut screws to attach the black supply lead to the bottom wire in the pump and the white supply lead to the top wire in the pump. The green ground wire attaches to the ground screw.
28. Re-install the pump electrical cover.
29. Turn water ON and open the booster outlet to fill the booster and remove air. Also, check for water leaks. Run 2-3 racks through dish machine with power off to purge air from system. Refer to the installation instructions if needed, regarding filling and turning on power.
30. Turn on power and check for proper operation.

SB-20 Testing the PT-56

Model: PT-56

Other service documents required:

Thermistor Reading – T-mid/T-out

Tools Required:

Precision screwdriver

Gas supply pressure (to regulator) = 7.0 – 10.5 wci for natural gas (NG)
11.0 – 14.0 wci for propane (LPG)

Water supply pressure to booster = 25 psig normal (60 psig maximum)

Instrumentation:

T-mid	**Circuit board thermistor reading (yellow test connector)**
T-out	**Circuit board thermistor reading (orange test connector)**
T-set	**Circuit board thermistor reading (blue test connector)**

Test Data :

1. **Turn power ON and verify that the green LED flashes.**
2. **Is the red LED flashing? If yes, refer to Section 5 in trouble-shooting manual.**
3. **Verify unit lights off at ignition burn (0.19 – 0.35 wci) and ramps to maximum burn (3.15 – 3.80 wci).**
4. **While the unit is heating to the stabilization temperature set the T-set as described in the owner's manual. Find the booster output temperature in the table below and then go to the column that specifies the T-set voltage. Refer to section 4.11 'Thermistor Checkout – T-mid/T-out' for a description on how to read T-set:**

Outlet Temperature	Stabilization Temperature	T_set Voltage, vdc
140	158 (1.27 vdc)	1.75
150	168 (1.10 vdc)	2.38
160	178 (0.95 vdc)	3.00
170	188 (0.82 vdc)	3.62
180	198 (0.71 vdc)	4.25

5. **Verify that the burner modulates down as the stabilization temperature is reached. The minimum burn is 0.90 – 1.50 wci).**
6. **Verify that the unit cycles ON and OFF at the stabilization temperature to control and hold the temperature.**
7. **Let the unit reach stabilization. When burner is OFF and right before a re-light read T-out voltage. Refer to Section 4.1 'Thermistor Checkout – T-mid/T-out' for a description on how to read the thermistors. This should be within ±0.02 vdc (±2°F) of the stabilization temperature listed in the table above.**
8. **Run several dishwasher cycles that the PT56 responds by igniting to maintain temperature.**
9. **Fail T-mid thermistor by disconnecting the 2-pin connector. Verify that gas flow is shutoff and the maintenance code is one on the red LED.**
10. **Verify that the unit does not leak water.**

Part #		Part Description
1019		Spark Ignition Probe
1024		3/8" Modulating gas valve PT-56 NG
1073		PT-56 Solenoid Valve LPG (Maxitrol)
1092		3/4" NG Modulating Gas Valve Assy, PT-200FT NG
1101		3/4" NG Modulating Gas Valve Assy PT-200 LPG OR
1119		3 AMP Circuit Breaker
1436		T-in Thermistor (blue wires) Assembly Kit
1437		T-out Thermistor (red wires) Assembly Kit
1854		Assembly T-Mid (1210) and CPI (1014)
1465		3 Gallon Water Tank Stainless Steel Tank for PT-56
1467		3/8" Modulating gas valve PT-56 LPG
1473		PT-56 3/4" Pressure relief valve 215F, 150 PSI
1496		Power wire harness to control board
1570		PT-56 Solenoid Valve NG (Maxitrol)
1613		110 VAC to 24 VDC Power Supply (regulated, 40 watt (1.7 A))
1615		RELAY, 110 VAC Circuit, 12 VDC Control
1616		Pressure Switch normally open, 1/4 WCI Vacuum 12 VDC
1662		3/4" NG Modulating Gas Valve Assy, PT-200FT LPG
1716		High Temp Sight Glass 2" x 2"
1749		Bimetal ECO 1/8" NPT @ 220 F +/- 7 auto reset at 170 F
1752		PT-200 Pressure Relief 3/4" X 3/4" Pressure only 150PSI
1765		Ignition Cable for PT-200 & PT-56 (Mod. As 1412)
1827		DSI Wiring Harness
1875		Blower Assembly for PT-200

1896		Dual Temp Digital Display Unit for PT-200 Model
1897		12 VDC Switching Power Supply
1985		Heat Exchanger Assy. PT-56 Assy./ ECO/T-mid/ T-in
1994		Heat Exchanger Assy. PT-200 Assy./ ECO/T-mid/ T-in/T-out
2004		SWITCH ON/OFF Switch DPST, 110 VAC
2005		Splash Guard for #2004 Rocker Switch
2066		T-in for PT200 Digital Read-Out
2067		T-out for PT200 Digital Read-Out
2354		Flow Meter (gaskets included)
2416		Flowmeter gaskets
2937		Pressure Switch normally open, (After 1/31/07) 12VDC
2957		3/4" NG Modulating Gas Valve Assy PT-200 NG OR
3158		DSI Board
3166		DSI Board mounting pedestal
1489AF		Grundfos pump UP 26-96 BF, PT-200RC & PT-56
1841-200T		Control Board & Microprocessor for PT-200FT 9097T
1841-200		Control Board & Microprocessor for PT-200FT 9097J
1841-56		Control Board & Microprocessor for PT-56 9098N
1841-ORT		Control Board & Microprocessor for PT-200OR 9099T
1841-OR		Control Board & Microprocessor for PT-200OR 9099D
1841-RC		Control Board & Microprocessor for PT-200RC 9098O
1170		PT-56 NG gas burner assembly
2409		Dinosaur DSI Board
1497		PT-56 DSI Harness
1827		PT-200 DSI Harness
3186		PT-200 Complete Wiring Harness
1329		PT-200 Thermistor Harness PT-200 FT or OR models

1495		**PT-200RC & PT-56 Thermistor Harness**
2065		**PT-200FT NG Burner & Manifold Assy**
2500		**PT-200-OR NG Burner & Manifold Assy**
1777		**PT-56 LPG Burner & Manifold Assy**
1819		**PT-56 NG Burner & Manifold Assy**
1463		**PT-200 Solenoid Valve NG Robertshaw**
1663-0		**PT-200 Solenoid Valve LPG Robertshaw**

Preventive Maintenance

1. **Inspect and clean all cabinet louvers and interior of cabinet of dust and debris. ****

2. **Remove blower hood, clean all dust and debris from baffles. Inspect top of heat exchanger for carbon build up. Clean debris from blower squirrel cage ******

3. **Inspect for burnt or brittle wiring and any heat damage to interior components. Inspect for any water damage or corrosion to electrical components and connections. *****

4. **Check overall operation of flow through and recirculation models making sure final rinse temperature of 180 degrees reached. For PT-200FT models incoming water temperature should be 120-140 degrees. Check water flow rate, approximately 12-15 flashes (4-5gpm) for FT standard flow through booster and 6-9 flashes (2-3gpm) for a FTOR low flow booster during the dish machine rinse cycle. ****

5. **Inspect for clean combustion, viewed through sight glass; blue flame not yellow. *****

6. **Inspect exterior of copper heat exchanger for dark discoloration, solder melted from front support tube (PT-200) and silver ash on floor of cabinet. Call PrecisionTemp if any of these symptoms are observed. *****

7. **Inspect for internal water leaks. ****

8. **Inspect for excessive positive or negative air; Exhaust Blower cage will turn counter clockwise, with booster power off. Call PT with questions. *****

9. **Inspect overall conditions surrounding booster for excessive water abuse, cleanliness and items stacked around booster restricting air flow. ***

10. **Check expansion tank pressure. Pressure should be maintained at approximately 40-80 psi depending on water pressure . *****

11. **Inspect and or clean all water filters, chemical disbursing equipment, etc. to avoid restricting water flow to dish machine. ****

12. **Perform dish machine maintenance, clean strainer screen, rinse nozzles and inspect rinse arm gaskets if applicable. ****

* = Weekly **= Monthly *** = Quarterly ****= Annual